

2008

# **SERVICE MANUAL**

**WR250RX(C) WR250XX(C)** 





WR250RX(C)/WR250XX(C)
SERVICE MANUAL
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FAS20070

#### NOTICE

This manual was produced by the Yamaha Motor Company, Ltd. primarily for use by Yamaha dealers and their qualified mechanics. It is not possible to include all the knowledge of a mechanic in one manual. Therefore, anyone who uses this book to perform maintenance and repairs on Yamaha vehicles should have a basic understanding of mechanics and the techniques to repair these types of vehicles. Repair and maintenance work attempted by anyone without this knowledge is likely to render the vehicle unsafe and unfit for use.

This model has been designed and manufactured to perform within certain specifications in regard to performance and emissions. Proper service with the correct tools is necessary to ensure that the vehicle will operate as designed. If there is any question about a service procedure, it is imperative that you contact a Yamaha dealer for any service information changes that apply to this model. This policy is intended to provide the customer with the most satisfaction from his vehicle and to conform to federal environmental quality objectives.

Yamaha Motor Company, Ltd. is continually striving to improve all of its models. Modifications and significant changes in specifications or procedures will be forwarded to all authorized Yamaha dealers and will appear in future editions of this manual where applicable.

#### NOTE:

- This Service Manual contains information regarding periodic maintenance to the emission control system. Please read this material carefully.
- Designs and specifications are subject to change without notice.

EAS20080

# **IMPORTANT MANUAL INFORMATION**

Particularly important information is distinguished in this manual by the following.



The Safety Alert Symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!



Failure to follow WARNING instructions <u>could result in severe injury or death</u> to the vehicle operator, a bystander or a person checking or repairing the vehicle.

**CAUTION:** 

A CAUTION indicates special precautions that must be taken to avoid damage to the vehicle.

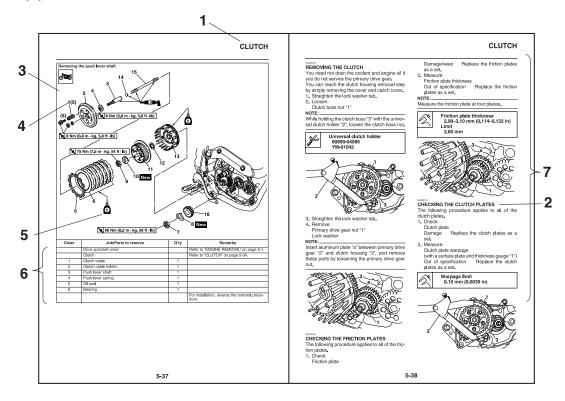
NOTE:

A NOTE provides key information to make procedures easier or clearer.

#### **HOW TO USE THIS MANUAL**

This manual is intended as a handy, easy-to-read reference book for the mechanic. Comprehensive explanations of all installation, removal, disassembly, assembly, repair and check procedures are laid out with the individual steps in sequential order.

- The manual is divided into chapters and each chapter is divided into sections. The current section title is shown at the top of each page "1".
- Sub-section titles appear in smaller print than the section title "2".
- To help identify parts and clarify procedure steps, there are exploded diagrams at the start of each removal and disassembly section "3".
- Numbers are given in the order of the jobs in the exploded diagram. A number indicates a disassembly step "4".
- Symbols indicate parts to be lubricated or replaced "5". Refer to "SYMBOLS".
- A job instruction chart accompanies the exploded diagram, providing the order of jobs, names of parts, notes in jobs, etc "6".
- Jobs requiring more information (such as special tools and technical data) are described sequentially "7".

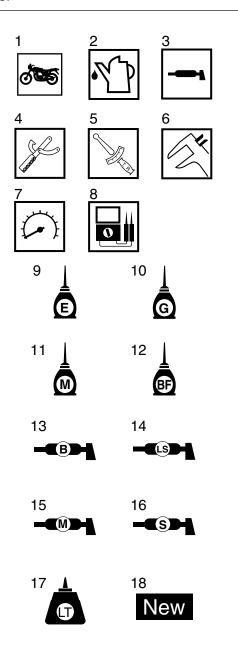


# **SYMBOLS**

The following symbols are used in this manual for easier understanding.

NOTE:

The following symbols are not relevant to every vehicle.



- 1. Serviceable with engine mounted
- 2. Filling fluid
- 3. Lubricant
- 4. Special tool
- 5. Tightening torque
- 6. Wear limit, clearance
- 7. Engine speed
- 8. Electrical data
- 9. Engine oil
- 10. Gear oil
- 11. Molybdenum-disulfide oil
- 12. Brake fluid
- 13. Wheel-bearing grease
- 14. Lithium-soap-based grease
- 15. Molybdenum-disulfide grease
- 16. Silicone grease
- 17. Apply locking agent (LOCTITE®)
- 18. Replace the part

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# **GENERAL INFORMATION**

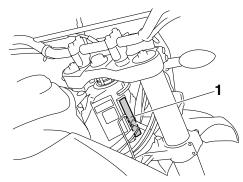
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# **IDENTIFICATION**

EAS20140

# **VEHICLE IDENTIFICATION NUMBER**

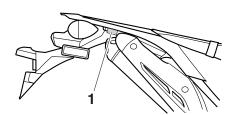
The vehicle identification number "1" is stamped into the right side of the steering head pipe.



EAS20150

# **MODEL LABEL**

The model label "1" is affixed to the frame. This information will be needed to order spare parts.



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#### **FEATURES**

FAS32D1017

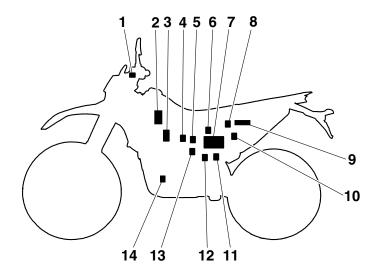
#### **OUTLINE OF THE FI SYSTEM**

The main function of a fuel supply system is to provide fuel to the combustion chamber at the optimum air-fuel ratio in accordance with the engine operating conditions and the atmospheric temperature. In the conventional carburetor system, the air-fuel ratio of the mixture that is supplied to the combustion chamber is created by the volume of the intake air and the fuel that is metered by the jet used in the respective carburetor.

Despite the same volume of intake air, the fuel volume requirement varies by the engine operating conditions, such as acceleration, deceleration, or operating under a heavy load. Carburetors that meter the fuel through the use of jets have been provided with various auxiliary devices, so that an optimum air-fuel ratio can be achieved to accommodate the constant changes in the operating conditions of the engine.

As the requirements for the engine to deliver more performance and cleaner exhaust gases increase, it becomes necessary to control the air-fuel ratio in a more precise and finely tuned manner. To accommodate this need, this model has adopted an electronically controlled fuel injection (FI) system, in place of the conventional carburetor system. This system can achieve an optimum air-fuel ratio required by the engine at all times by using a microprocessor that regulates the fuel injection volume according to the engine operating conditions detected by various sensors.

The adoption of the FI system has resulted in a highly precise fuel supply, improved engine response, better fuel economy, and reduced exhaust emissions.



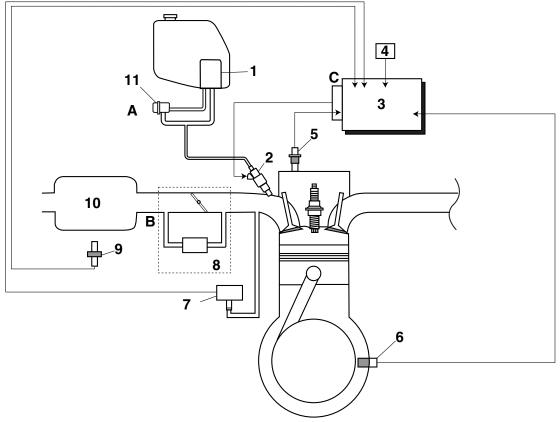
- 1. Engine trouble warning light
- 2. Fuel pump
- 3. Ignition coil
- 4. Fuel injector
- 5. Throttle position sensor
- 6. Intake air pressure sensor 1
- 7. Battery
- 8. Lean angle sensor
- 9. ECU

- 10. Intake air temperature sensor
- 11. EXUP servomotor
- 12. Speed sensor
- 13. Coolant temperature sensor
- 14. Crankshaft position sensor

EAS32D1018

## **FI SYSTEM**

The fuel pump delivers fuel to the fuel injector via the fuel filter. The pressure regulator is installed in the fuel rail, and maintains the fuel pressure that is applied to the fuel injector at 245–255 kPa (34.8–36.3 psi) (2.45–2.55 kg/cm²). The fuel injector is operated due to signals from the ECU, and injects fuel into the intake manifold. Since fuel is supplied only for the duration of injection, good fuel economy is obtained. The injection duration and the injection timing are controlled by the ECU. Signals that are input from the throttle position sensor, crankshaft position sensor, intake air pressure sensor, intake temperature sensor and coolant temperature sensor enable the ECU to determine the injection duration. The injection timing is determined through the signals from the crankshaft position sensor. As a result, the volume of fuel that is required by the engine can be supplied at all times in accordance with the driving conditions.



- 1. Fuel pump
- 2. Injector
- 3. ECU
- 4. Throttle position sensor
- 5. Coolant temperature sensor
- 6. Crankshaft position sensor
- 7. Intake air pressure sensor
- 8. Throttle bodies
- 9. Intake air temperature sensor
- 10. Air filter case
- 11. Pulsation damper

- A. Fuel system
- B. Intake system
- C. Control system

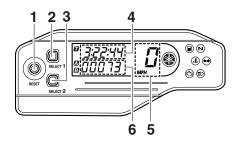
FAS32D1004

## **MULTI-FUNCTION DISPLAY**

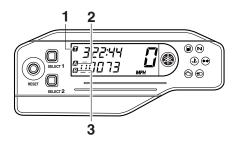
EWA32D1008

# **WARNING**

Be sure to stop the vehicle before making any setting changes to the multi-function display.



- 1. "RESET" button
- 2. "SELECT 1" button
- 3. "SELECT 2" button
- 4. Clock/stopwatch
- 5. Speedometer
- 6. Odometer/tripmeter/fuel reserve tripmeter



- 1. Stopwatch indicator "a"
- 2. Tripmeter A indicator " "/Distance-compensation tripmeter " " "
- 3. Tripmeter B indicator "B"

#### NOTE:

- The multi-function display can be set to the basic mode or the measurement mode.
- Tripmeter A will automatically reset to zero when changing from the basic mode to the measurement mode or vice versa.

# Basic mode:

- a speedometer (which shows the riding speed)
- an odometer (which shows the total distance traveled)
- two tripmeters (which show the distance traveled since they were last set to zero)
- a fuel reserve tripmeter (which shows the distance traveled since the fuel level warning light came on)
- a clock
- a self-diagnosis device

#### Measurement mode:

- a speedometer (which shows the riding speed)
- a distance-compensation tripmeter (which shows the accumulated distance traveled since set to zero and which can be calibrated to provide a more accurate tripmeter reading)
- a stopwatch (which shows the time that has been accumulated since the start of stopwatch measurement)
- a self-diagnosis device

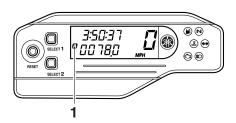
#### NOTE:

- Be sure to turn the key to "ON" before using the "SELECT 1", "SELECT 2" and "RESET" buttons.
- When the key is turned to "ON", all of the display segments of the multi-function display will appear and then disappear, in order to test the electrical circuit.
- •To switch the speedometer and odometer/ tripmeter displays between kilometers and miles, press the "SELECT 2" button until the display changes after the main switch is turned to "ON".

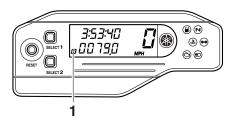
# **Basic mode**

# Odometer and tripmeter modes

Push the "SELECT 2" button to switch the display between the odometer mode and the tripmeter modes A and B in the following order: odometer  $\rightarrow$  tripmeter A  $\rightarrow$  tripmeter B  $\rightarrow$  odometer



1. Tripmeter A indicator "A"



1. Tripmeter B indicator "B"

#### NOTE:

Indicator "a" comes on when tripmeter A is selected, and indicator "a" comes on when tripmeter B is selected.

If the fuel level warning light comes on, the display will automatically change to the fuel reserve tripmeter mode "F" and start counting the distance traveled from that point. In this case, push the "SELECT 2" button to switch the display between the various tripmeter and odometer modes in the following order:

fuel reserve tripmeter "F"  $\to$  odometer  $\to$  tripmeter A  $\to$  tripmeter B  $\to$  fuel reserve tripmeter "F"

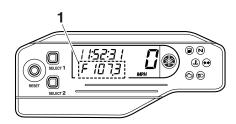
#### NOTE: \_

The fuel level warning light may not function accurately while riding off road as the fuel level reading changes due to the movement and inclination of the vehicle.

If the fuel level warning light comes on while riding in the measurement mode, change to the basic mode and push the "SELECT 2" button to display the fuel reserve tripmeter.

# NOTE: \_

To change from the measurement mode to the basic mode, the stopwatch and the distance-compensation tripmeter must be stopped.



1. Fuel reserve tripmeter "F"

To reset a tripmeter, select it by pushing the "SELECT 2" button, and then push the "RESET" button for at least one second. If you do not reset the fuel reserve tripmeter manually, it will reset itself automatically and the display will return to the prior mode after refueling and traveling 5 km (3 mi).

## Clock

Turn the key to "ON".

# NOTE:

When setting the clock, push the "SELECT 1" button to increase the digits or "SELECT 2" button to decrease the digits. Pushing and holding either button will increase or decrease the digits

continuously until the button is released.

To set the clock

- 1. Push the "SELECT 1" button for at least two seconds.
- 2. When the hour digits start flashing, push either select button to set the hours.
- 3. Push the "RESET" button, and the minute digits will start flashing.
- 4. Push either select button to set the minutes.
- 5. Push the "RESET" button, and the second digits will start flashing.
- 6. Push either select button to set the second digits to zero.
- 7. Push the "RESET" button for at least two seconds, and then release it to start the clock.

#### NOTE: \_

If the "RESET" button is not pushed within 30 seconds, the clock will not be set and will return to the prior time.

# Changing from the basic mode to the measurement mode

With the odometer selected, push the "SELECT 1" button and "SELECT 2" button together for at least two seconds to change to the measurement mode.

# Changing from the measurement mode to the basic mode

#### NOTE:

The stopwatch must be stopped before changing to the basic mode.

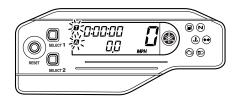
- 1. Check that the stopwatch is not in operation. If the stopwatch is in operation, stop it by pushing the "SELECT 1" button and "SELECT 2" button together.
- 2. Push the "SELECT 1" button and "SELECT 2" button together for at least two seconds to change to the basic mode.

# Measurement mode (for the stopwatch)

When the measurement mode is selected, the stopwatch is displayed and it can be started manually or automatically.

## Manual start

The manual start is the default setting for the stopwatch. The stopwatch indicator " $\boldsymbol{\sigma}$ " and the distance-compensation tripmeter indicator " $\boldsymbol{\sigma}$ " will start flashing.



- 1. Push the "RESET" button to start the stopwatch.
- 2. Push the "SELECT 1" button and "SELECT 2" button together to stop the stopwatch.
- 3. To resume stopwatch counting, push the "SELECT 1" button and "SELECT 2" button together.

To reset the stopwatch to zero, see "Resetting the distance-compensation tripmeter or the distance-compensation tripmeter in combination with the stopwatch".

#### NOTE:

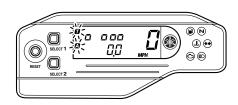
The stopwatch will continue counting when the vehicle is stopped. To stop and/or resume counting, repeat steps 2 and 3.

### Auto start

1. Push the "SELECT 1" button for at least two seconds to set the auto start.

#### NOTE:

When the stopwatch is set to auto start, the stopwatch indicator "a" and the distance-compensation tripmeter indicator "a" will start flashing, and the digits in the display will start scrolling from left to right.



- 2. When the vehicle starts moving, the stopwatch will start counting.
- 3. Push the "SELECT 1" button and "SELECT 2" button together to stop the stopwatch.
- 4. To resume counting, push the "SELECT 1" button and "SELECT 2" button together again.

#### NOTE:

The stopwatch will continue counting when the vehicle is stopped. To stop and/or resume

counting, repeat steps 3 and 4.

# Measurement mode (for calibrating the distance-compensation tripmeter's reading)

The distance-compensation tripmeter is a feature intended to provide a more accurate tripmeter reading for enduro riding. Calibrating this meter in accordance with the distances specified on the enduro course map will help familiarize the rider with the course. In addition, calibrating the meter may also be necessary when using tire, wheel, chain sprocket sizes, etc. other than specified.

Calibrate the distance-compensation tripmeter as follows.

To increase the reading, push the "SELECT 1" button. To decrease the reading, push the "SELECT 2" button. Pushing and holding either button will increase or decrease the reading continuously until the button is released.

#### NOTE:

Calibrating the reading of the distance-compensation tripmeter is possible regardless of the stopwatch operation.

Resetting the distance-compensation tripmeter or the distance-compensation tripmeter in combination with the stopwatch

#### NOTE:

Resetting can be made only to the distance-compensation tripmeter or to the distance-compensation tripmeter in combination with the stopwatch.

Resetting the distance-compensation tripmeter

- 1. Check that the stopwatch measurement is in operation.
- 2. Reset the distance-compensation tripmeter to zero by pushing the "RESET" button for at least two seconds.

Resetting the distance-compensation tripmeter in combination with the stopwatch

- 1. Stop the stopwatch.
- 2. Reset the distance-compensation tripmeter and the stopwatch to zero by pushing the "RESET" button for at least two seconds.

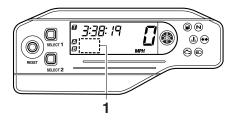
## Self-diagnosis device

This model is equipped with a self-diagnosis device for various electrical circuits.

If any of those circuits are defective, the engine trouble warning light will come on, and then the display will indicate a two-digit error code.

If the display indicates any error codes, note the code number, and then check the fuel injection

system. Refer to "FUEL INJECTION SYSTEM" on page 8-29.



1. Error code display

ECA32D1007

# **CAUTION:**

If the display indicates an error code, the vehicle should be checked as soon as possible in order to avoid engine damage.

## IMPORTANT INFORMATION

FAS20190

# PREPARATION FOR REMOVAL AND DISASSEMBLY

1. Before removal and disassembly, remove all dirt, mud, dust and foreign material.



- Use only the proper tools and cleaning equipment.
  - Refer to "SPECIAL TOOLS" on page 1-11.
- When disassembling, always keep mated parts together. This includes gears, cylinders, pistons and other parts that have been "mated" through normal wear. Mated parts must always be reused or replaced as an assembly.



- During disassembly, clean all of the parts and place them in trays in the order of disassembly. This will speed up assembly and allow for the correct installation of all parts.
- 5. Keep all parts away from any source of fire.

EAS20200

# REPLACEMENT PARTS

Use only genuine Yamaha parts for all replacements. Use oil and grease recommended by Yamaha for all lubrication jobs. Other brands may be similar in function and appearance, but inferior in quality.



EAS20210

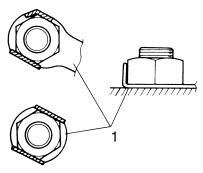
# **GASKETS, OIL SEALS AND O-RINGS**

- When overhauling the engine, replace all gaskets, seals and O-rings. All gasket surfaces, oil seal lips and O-rings must be cleaned.
- 2. During reassembly, properly oil all mating parts and bearings and lubricate the oil seal lips with grease.

FAS20220

# LOCK WASHERS/PLATES AND COTTER PINS

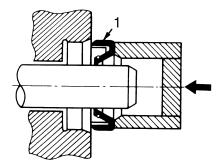
After removal, replace all lock washers/plates "1" and cotter pins. After the bolt or nut has been tightened to specification, bend the lock tabs along a flat of the bolt or nut.



EAS20230

# **BEARINGS AND OIL SEALS**

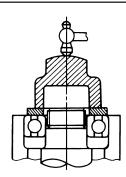
Install bearings and oil seals so that the manufacturer's marks or numbers are visible. When installing oil seals "1", lubricate the oil seal lips with a light coat of lithium-soap-based grease. Oil bearings liberally when installing, if appropriate.



ECA13300

# **CAUTION:**

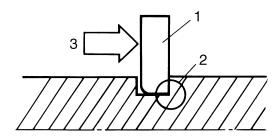
Do not spin the bearing with compressed air because this will damage the bearing surfaces.



EAS20240

## **CIRCLIPS**

Before reassembly, check all circlips carefully and replace damaged or distorted circlips. Always replace piston pin clips after one use. When installing a circlip "1", make sure the sharp-edged corner "2" is positioned opposite the thrust "3" that the circlip receives.



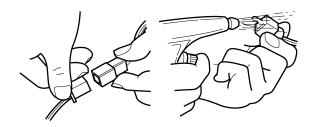
## CHECKING THE CONNECTIONS

Check the leads, couplers, and connectors for stains, rust, moisture, etc.

- 1. Disconnect:
- Lead
- Coupler
- Connector
- 2. Check:
- Lead
- Coupler
- Connector

Moisture  $\rightarrow$  Dry with an air blower. Rust/stains  $\rightarrow$  Connect and disconnect

Rust/stains  $\rightarrow$  Connect and disconnect several times.

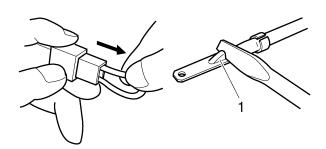


# 3. Check:

All connections
 Loose connection → Connect properly.

#### NOTF:

If the pin "1" on the terminal is flattened, bend it up.



- 4. Connect:
- Lead
- Coupler
- Connector

## NOTE:

Make sure all connections are tight.

## 5. Check:

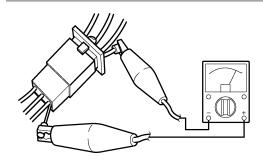
Continuity
 (with the pocket tester)

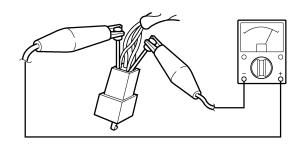


Pocket tester 90890-03112 Analog pocket tester YU-03112-C

## NOTE:

- If there is no continuity, clean the terminals.
- When checking the wire harness, perform steps (1) to (3).
- As a quick remedy, use a contact revitalizer available at most part stores.





## **SPECIAL TOOLS**

The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools as this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools, part numbers or both may differ depending on the country. When placing an order, refer to the list provided below to avoid any mistakes.

#### NOTF:

For U.S.A. and Canada, use part number starting with "YM-", "YU-", or "ACC-". For others, use part number starting with "90890-".

| Tool name/Tool No.  | Illustration                          | Reference pages |
|---|---------------------------------------|-----------------|
| Crankcase separating tool<br>90890-01135<br>Crankcase separator<br>YU-01135-B | 90890-01135<br>M8×P1.25<br>M8×P1.25   | 5-62            |
|   | YU-01135-B M5×P0.80 M8×P1.25 M6×P1.00 |                 |
| Ring nut wrench<br>90890-01268<br>Spanner wrench<br>YU-01268                  | R22                                   | 4-51            |
| Crankshaft installer pot<br>90890-01274<br>Installing pot<br>YU-90058         | 90890-01274                           | 5-63            |
|   | YU-90058/YU-90059                     |                 |
| Crankshaft installer bolt<br>90890-01275<br>Bolt<br>YU-90060                  | M14×P1.5                              | 5-63            |
| Adapter (M12)<br>90890-01278<br>Adapter #3<br>YU-90063                        | M12×P1.25                             | 5-63            |

| Tool name/Tool No.   | Illustration          | Reference pages |
|--|-----------------------|-----------------|
| Spacer (crankshaft installer)<br>90890-04081<br>Pot spacer<br>YM-91044                     | 90890-04081           | 5-63            |
|  | YM-91044              |                 |
| Radiator cap tester<br>90890-01325<br>Radiator pressure tester<br>YU-24460-01              | 90890-01325           | 6-2             |
|  | YU-24460-01           |                 |
| Radiator cap tester adapter<br>90890-01352<br>Radiator pressure tester adapter<br>YU-33984 | 90890-01352 031.4 038 | 6-2             |
| Steering nut wrench<br>90890-01403<br>Spanner wrench<br>YU-33975                           | R20                   | 3-25            |
| Thickness gauge<br>90890-03180<br>Feeler gauge set<br>YU-26900-9                           |                       | 3-4             |
| Fork seal driver<br>90890-01442<br>Adjustable fork seal driver (36–46 mm)<br>YM-01442      |                       | 4-45            |

| Tool name/Tool No.   | Illustration   | Reference pages   |
|--|--|---|
| Damper rod holder<br>90890-01454   | ø30  | 4-42, 4-44  |
| Spoke nipple wrench (8–9)<br>90890-01522<br>YM-01522                                     | EB 8 9 8 5   | 3-31  |
| Sheave holder<br>90890-01701<br>Primary clutch holder<br>YS-01880-A                      |  | 5-53, 5-54  |
| Compression gauge<br>90890-03081<br>Engine compression tester<br>YU-33223                |  | 3-9   |
| Pocket tester<br>90890-03112<br>Analog pocket tester<br>YU-03112-C                       |  | 1-10, 5-32,<br>8-65, 8-66,<br>8-67, 8-71,<br>8-72, 8-73,<br>8-74, 8-75,<br>8-76, 8-77,<br>8-78, 8-79,<br>8-81 |
| Timing light<br>90890-03141<br>Inductive clamp timing light<br>YU-03141                  |  | 3-9   |
| Pressure gauge<br>90890-03153<br>YU-03153  | The state of the s | 7-6   |
| Vacuum/pressure pump gauge set<br>90890-06756<br>Mityvac brake bleeding tool<br>YS-42423 | Organia (Constitution of the Constitution of t | 7-6   |

| Tool name/Tool No.   | Illustration                       | Reference pages |
|--|------------------------------------|-----------------|
| Digital circuit tester<br>90890-03174<br>Model 88 Multimeter with tachometer<br>YU-A1927 |                                    | 7-7, 8-80, 8-81 |
| Fuel pressure adapter<br>90890-03176<br>YM-03176   |                                    | 7-6             |
| Middle driven shaft bearing driver<br>90890-04058<br>Bearing driver 40 mm<br>YM-04058    | ø40<br>Ø40                         | 6-7             |
| Mechanical seal installer<br>90890-04145   |                                    | 6-7             |
| Universal clutch holder<br>90890-04086<br>YM-91042                                       | 90890-04086 M8×P1.25<br>30 119 156 | 5-38, 5-40      |
|  | YM-91042                           |                 |
| Valve lapper<br>90890-04101<br>Valve lapping tool<br>YM-A8998                            | 014                                | 3-5             |
| Valve spring compressor<br>90890-04019<br>YM-04019                                       | e31, M6×P1.0                       | 5-18, 5-23      |

| Tool name/Tool No.  | Illustration | Reference pages |
|---|--------------|-----------------|
| Valve guide remover (ø4.5)<br>90890-04116<br>Valve guide remover (4.5 mm)<br>YM-04116 | 04.5         | 5-20            |
| Valve guide installer (4.5ø)<br>90890-04117<br>YM-04117                               | Ø4.5<br>Ø10  | 5-20            |
| Valve guide reamer (4.5ø)<br>90890-04118<br>YM-04118                                  | 4.5 mm       | 5-20            |
| Rotor puller<br>90890-04142<br>YM-04142   | M33xP1.5     | 5-53            |
| Ignition checker<br>90890-06754<br>Opama pet-4000 spark checker<br>YM-34487           |              | 8-74            |
| Digital tachometer<br>90890-06760<br>YU-39951-B                                       |              | 3-6, 3-9        |
| Yamaha bond No. 1215 (Three Bond No.1215®)<br>90890-85505                             |              | 5-60            |

# **SPECIFICATIONS**

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# **GENERAL SPECIFICATIONS**

| lodel                  |                                |  |
|------------------------|--------------------------------|--|
| Model                  | WR250R 32C1 (U49)              |  |
|                        | WR250R 32C3 (CAL)              |  |
|                        | WR250X 32C2 (U49)              |  |
|                        | WR250X 32C4 (CAL)              |  |
| mensions               |                                |  |
| Overall length         | WR250R 2175 mm (85.6 in)       |  |
|                        | WR250X 2110 mm (83.1 in)       |  |
| Overall width          | 810 mm (31.9 in)               |  |
| Overall height         | WR250R 1230 mm (48.4 in)       |  |
|                        | WR250X 1190 mm (46.9 in)       |  |
| Seat height            | WR250R 930 mm (36.6 in)        |  |
|                        | WR250X 895 mm (35.2 in)        |  |
| Wheelbase              | WR250R 1420 mm (55.9 in)       |  |
|                        | WR250X 1425 mm (56.1 in)       |  |
| Ground clearance       | WR250R 295 mm (11.61 in) (CAL) |  |
|                        | WR250R 300 mm (11.81 in) (U49) |  |
|                        | WR250X 260 mm (10.24 in) (CAL) |  |
|                        | WR250X 265 mm (10.43 in) (U49) |  |
| Minimum turning radius | 2300 mm (90.6 in)              |  |
| /eight                 |                                |  |
| With oil and fuel      | WR250R 134.0 kg (295 lb) (U49) |  |
|                        | WR250R 135.0 kg (298 lb) (CAL) |  |
|                        | WR250X 136.0 kg (300 lb) (U49) |  |
|                        | WR250X 137.0 kg (302 lb) (CAL) |  |
| Maximum load           | 185 kg (408 lb)                |  |

# **ENGINE SPECIFICATIONS**

| ENGINE SPECIFICATIONS                                     |   |
|---|---|
| Engine  |   |
| Engine type   | Liquid cooled 4-stroke, DOHC                                |
| Displacement  | 250.0 cm <sup>3</sup>                                       |
| Cylinder arrangement                                      | Forward-inclined single cylinder                            |
| Bore × stroke   | $77.0 \times 53.6 \text{ mm} (3.03 \times 2.11 \text{ in})$ |
| Compression ratio   | 11.80 :1  |
| Starting system   | Electric starter  |
| Fuel  |   |
| Recommended fuel  | Premium unleaded gasoline only                              |
| Fuel tank capacity  | WR250R 7.2 L (1.90 US gal) (1.58 Imp.gal)                   |
|   | (CAL)   |
|   | WR250R 7.6 L (2.01 US gal) (1.67 Imp.gal)                   |
|   | (U49)   |
|   | WR250X 7.2 L (1.90 US gal) (1.58 Imp.gal)                   |
|   | (CAL)   |
|   | WR250X 7.6 L (2.01 US gal) (1.67 Imp.gal)                   |
|   | (U49)   |
| Fuel reserve amount                                       | 2.1 L (0.55 US gal) (0.46 Imp.gal)                          |
|   |   |
| Engine oil  | Wet auma  |
| Lubrication system  | Wet sump  |
| Type  | YAMALUBE 4, SAE 10W-30 or SAE 20W-40                        |
| Recommended engine oil grade                              | API service SG type or higher, JASO standard MA             |
| Engine oil quantity                                       | IVIA  |
|   | 1 FO L (1 FO LIC at) (1 20 lmp at)                          |
| Total amount  | 1.50 L (1.59 US qt) (1.32 Imp.qt)                           |
| Without oil filter element replacement                    | 1.30 L (1.37 US qt) (1.14 Imp.qt)                           |
| With oil filter element replacement                       | 1.40 L (1.48 US qt) (1.23 Imp.qt)                           |
| Oil filter type   | Paper   |
| Oil pump  |   |
| Oil pump type   | Trochoid  |
| Inner-rotor-to-outer-rotor-tip clearance                  | Less than 0.120 mm (0.0047 in)                              |
| Limit   | 0.20 mm (0.0079 in)   |
| Outer-rotor-to-oil-pump-housing clearance                 | 0.090–0.160 mm (0.0035–0.0063 in)                           |
| Limit   | 0.230 mm (0.0091 in)  |
| Oil-pump-housing-to-inner-and-outer-rotor clearance       | 0.030-0.100 mm (0.0012-0.0039 in)                           |
| Limit   | 0.17 mm (0.0067 in)   |
| Bypass valve opening pressure                             | 500.0–600.0 kPa (72.5–87.0 psi) (5.00–6.00                  |
|   | kgf/cm <sup>2</sup> )                                       |
| Cooling system  |   |
| Radiator capacity (including all routes)                  | 0.90 L (0.95 US qt) (0.79 Imp.qt)                           |
| Radiator capacity   | 0.32 L (0.34 US qt) (0.28 Imp.qt)                           |
| Coolant reservoir capacity (up to the maximum level mark) | 0.25 L (0.26 US qt) (0.22 Imp.qt)                           |
| Radiator cap opening pressure                             | 108.0-137.4 kPa (15.7-19.9 psi) (1.08-1.37                  |
|   | kgf/cm <sup>2</sup> )                                       |
| Radiator core   |   |
| Width   | 121.4 mm (4.78 in)  |
| Height  | 246.0 mm (9.69 in)  |
| Depth   | 28.0 mm (1.10 in)   |
|   | •   |

Spark plug (s)

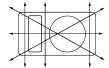
Manufacturer/model

Spark plug gap 0.6–0.7 mm (0.024–0.028 in)

Cylinder head

Volume Warpage limit 15.36 cm<sup>3</sup> (0.94 cu.in) 0.05 mm (0.0020 in)

NGK/CR9EK



Camshaft

Drive system

Camshaft cap inside diameter Camshaft journal diameter

Camshaft-journal-to-camshaft-cap clearance

Limit

Camshaft lobe dimensions

Intake A Limit

Intake B Limit

Exhaust A

Limit

Exhaust B Limit Chain drive (left)

22.000–22.021 mm (0.8661–0.8670 in) 21.959–21.972 mm (0.8645–0.8650 in) 0.028–0.062 mm (0.0011–0.0024 in)

0.08 mm (0.0031 in)

34.550-34.650 mm (1.3602-1.3642 in)

35.450 mm (1.3957 in)

25.953-26.053 mm (1.0218-1.0257 in)

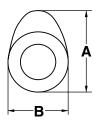
25.853 mm (1.0178 in)

34.850-34.950 mm (1.3720-1.3760 in)

34.750 mm (1.3681 in)

25.986–26.086 mm (1.0231–1.0270 in)

25.886 mm (1.0191 in)



Camshaft runout limit 0.015 mm (0.0006 in)

Timing chain

Model/number of links 98XRH2010-118M

Tensioning system Automatic

Valve, valve seat, valve guide

Valve clearance (cold)

Intake 0.13–0.20 mm (0.0051–0.0079 in) Exhaust 0.23–0.30 mm (0.0091–0.0118 in)

Valve dimensions

Valve head diameter A (intake) 29.90–30.10 mm (1.1772–1.1850 in) Valve head diameter A (exhaust) 24.40–24.60 mm (0.9606–0.9685 in)



Valve face width B (intake)
Valve face width B (exhaust)

1.840 mm (0.0724 in) 2.260 mm (0.0890 in)



Valve seat width C (intake)
Valve seat width C (exhaust)

0.90–1.10 mm (0.0354–0.0433 in) 0.90–1.10 mm (0.0354–0.0433 in)



Valve margin thickness D (intake)

I imit

Valve margin thickness D (exhaust)

Limit

1.15–1.45 mm (0.0453–0.0571 in)

1.00 mm (0.04 in)

0.85-1.15 mm (0.0335-0.0453 in)

0.70 mm (0.03 in)



Valve stem diameter (intake)

Valve stem diameter (exhaust)

Valve guide inside diameter (intake)

Valve guide inside diameter (exhaust)

Valve-stem-to-valve-guide clearance (intake)

I imit

Valve-stem-to-valve-guide clearance (exhaust)

Limit

Valve stem runout

4.475–4.490 mm (0.1762–0.1768 in)

4.460-4.475 mm (0.1756-0.1762 in)

4.500-4.512 mm (0.1772-0.1776 in)

4.500–4.512 mm (0.1772–0.1776 in)

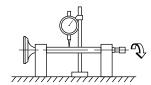
0.010-0.037 mm (0.0004-0.0015 in)

0.080 mm (0.0032 in)

0.025-0.052 mm (0.0010-0.0020 in)

0.100 mm (0.0039 in)

0.010 mm (0.0004 in)



Cylinder head valve seat width (intake) Cylinder head valve seat width (exhaust) 0.90-1.10 mm (0.0354-0.0433 in) 0.90-1.10 mm (0.0354-0.0433 in)

# Valve spring

Free length (intake) 36.03 mm (1.42 in)

Limit 34.23 mm (1.35 in)

Free length (exhaust) 36.03 mm (1.42 in)

Limit 34.23 mm (1.35 in)

Installed length (intake) 31.00 mm (1.22 in)
Installed length (exhaust) 31.00 mm (1.22 in)

Spring rate K1 (intake) 31.47 N/mm (179.69 lb/in) (3.21 kgf/mm)

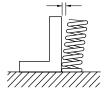
Spring rate K2 (intake) Spring rate K1 (exhaust) Spring rate K2 (exhaust)

Installed compression spring force (intake)

Installed compression spring force (exhaust)

Spring tilt (intake)
Spring tilt (exhaust)

40.90 N/mm (233.54 lb/in) (4.17 kgf/mm) 31.47 N/mm (179.69 lb/in) (3.21 kgf/mm) 40.90 N/mm (233.54 lb/in) (4.17 kgf/mm) 147.00–169.00 N (33.05–37.99 lbf) (14.99–17.23 kgf) 147.00–169.00 N (33.05–37.99 lbf) (14.99–17.23 kgf) 2.5 °/1.6 mm



Winding direction (intake) Winding direction (exhaust)

Clockwise Clockwise

2.5 °/1.6 mm

# Cylinder

 Bore
 77.000–77.010 mm (3.0315–3.0319 in)

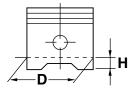
 Wear limit
 77.100 mm (3.0354 in)

 Taper limit
 0.050 mm (0.0020 in)

 Out of round limit
 0.050 mm (0.0020 in)

#### Piston

Piston-to-cylinder clearance Limit Diameter D Height H 0.010-0.035 mm (0.0004-0.0014 in) 0.10 mm (0.0039 in) 76.975-76.990 mm (3.0305-3.0311 in) 12.0 mm (0.47 in)



Offset

Offset direction

Piston pin bore inside diameter

Limit

Piston pin outside diameter

Limit

Piston-pin-to-piston-pin-bore clearance

0.50 mm (0.0197 in)

Intake side

17.002–17.013 mm (0.6694–0.6698 in)

17.043 mm (0.6710 in)

16.991–17.000 mm (0.6689–0.6693 in)

16.971 mm (0.6681 in)

0.002-0.022 mm (0.0001-0.0009 in)

# Piston ring

Top ring

Ring type

Dimensions (B  $\times$  T)



Barrel

Taper

 $0.90 \times 2.75 \text{ mm } (0.04 \times 0.11 \text{ in})$ 

0.15-0.25 mm (0.0059-0.0098 in)

0.030-0.065 mm (0.0012-0.0026 in)

End gap (installed)

Limit

Ring side clearance

Limit 2nd ring Ring type

Dimensions (B  $\times$  T)



Limit

Ring side clearance

End gap (installed)

Limit Oil ring

Dimensions  $(B \times T)$ 



0.30-0.45 mm (0.0118-0.0177 in)

 $0.80 \times 2.75 \text{ mm } (0.03 \times 0.11 \text{ in})$ 

0.80 mm (0.0315 in)

0.50 mm (0.0197 in)

0.115 mm (0.0045 in)

0.020-0.055 mm (0.0008-0.0022 in)

0.115 mm (0.0045 in)

 $1.50 \times 2.25 \text{ mm} (0.06 \times 0.09 \text{ in})$ 

End gap (installed)

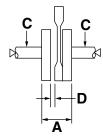
0.10-0.40 mm (0.0039-0.0157 in)

# Crankshaft

Width A

Runout limit C

Big end side clearance D



61.95–62.00 mm (2.439–2.441 in)

0.030 mm (0.0012 in)

0.350-0.650 mm (0.0138-0.0256 in)

Balancer

Balancer drive method

Gear

Clutch

Clutch type

Clutch release method Clutch lever free play Wet, multiple-disc Inner push, cam push 10.0–15.0 mm (0.39–0.59 in)

| Friction plate thickness                  | 2.90–3.10 mm (0.114–0.122 in)     |  |
|---|-----------------------------------|--|
| Wear limit                                | 2.80 mm (0.1102 in)               |  |
| Plate quantity                            | 7 pcs                             |  |
| Clutch plate thickness                    | 1.50–1.70 mm (0.059–0.067 in)     |  |
| Plate quantity                            | 6 pcs                             |  |
| Warpage limit                             | 0.10 mm (0.0039 in)               |  |
| Clutch spring free length                 | 41.20 mm (1.62 in)                |  |
| Minimum length                            | 39.14 mm (1.54 in)                |  |
| Spring quantity                           | 5 pcs                             |  |
| Push rod bending limit                    | 0.100 mm (0.0039 in)              |  |
| Transmission                              |                                   |  |
| Transmission type                         | Constant mesh 6-speed             |  |
| Primary reduction system                  | Spur gear                         |  |
| Primary reduction ratio                   | 78/25 (3.120)                     |  |
| Secondary reduction system                | Chain drive                       |  |
| Secondary reduction ratio                 | WR250R 43/13 (3.307)              |  |
|   | WR250X 42/13 (3.231)              |  |
| Operation                                 | Left foot operation               |  |
| Gear ratio                                |                                   |  |
| 1st                                       | 37/14 (2.642)                     |  |
| 2nd                                       | 29/16 (1.813)                     |  |
| 3rd                                       | 29/22 (1.318)                     |  |
| 4th                                       | 26/25 (1.040)                     |  |
| 5th                                       | 24/27 (0.888)                     |  |
| 6th                                       | 22/28 (0.786)                     |  |
| Shifting mechanism                        |                                   |  |
| Shift mechanism type                      | Shift drum and guide bar          |  |
| Shift fork guide bar bending limit        | 0.050 mm (0.0020 in)              |  |
| Shift fork thickness                      | 4.85 mm (0.1909 in)               |  |
| Decompression device                      |                                   |  |
| Device type                               | Auto decomp                       |  |
|   |                                   |  |
| Air filter                                | Wat alament                       |  |
| Air filter element                        | Wet element                       |  |
| Air filter oil grade                      | Foam air-filter oil or engine oil |  |
| Throttle body                             |                                   |  |
| Type/quantity                             | 38EIS/1                           |  |
| Manufacturer                              | MIKUNI                            |  |
| ID mark                                   | WR250R 32C3 00 (CAL)              |  |
|   | WR250R 3D71 10 (U49)              |  |
|   | WR250X 32C3 00 (CAL)              |  |
|   | WR250X 3D71 10 (U49)              |  |
| Fuel injection sensor                     |                                   |  |
| Crankshaft position sensor                | 248–278 $Ω$                       |  |
| Intake air pressure sensor output voltage | 3.75-4.25 V                       |  |
| Coolant temperature sensor resistance     | 2320-2590 Ω@20 °C (68°F)          |  |
|   | 310-326 Ω@80 °C (176 °F)          |  |
| Idling condition                          |                                   |  |
| Engine idling speed                       | 1450–1650 r/min                   |  |
| Intake vacuum                             | 28.3 kPa (8.4 inHg) (212 mmHg)    |  |
| Water temperature                         | 80 °C (176 °F)                    |  |
|   | ( /                               |  |

Oil temperature Throttle cable free play 60.0 °C (140.00 °F) 3.0–5.0 mm (0.12–0.20 in)

# **CHASSIS SPECIFICATIONS**

| $\Box \wedge$ | 520 | 300 |
|---------------|-----|-----|

# **CHASSIS SPECIFICATIONS**

| CHASSIS SPECIFICATIONS                     |  |
|--|--|
| Chassis  Frame type                        | Somi double gradle   |
| Frame type Caster angle                    | Semi double cradle<br>WR250R 26.67 °                           |
| Caster angle                               | WR250X 25.33 °   |
| Trail                                      | WR250R 111.0 mm (4.37 in)                                      |
| man  | WR250X 76.0 mm (2.99 in)                                       |
| Front wheel                                |  |
| Wheel type                                 | Spoke wheel  |
| Rim size                                   | WR250R 21x1.60   |
|  | WR250X 17M/C x MT3.00  |
| Rim material                               | Aluminum   |
| Wheel travel                               | 270.0 mm (10.63 in)  |
| Radial wheel runout limit                  | 2.0 mm (0.08 in)   |
| Lateral wheel runout limit                 | 2.0 mm (0.08 in)   |
| Wheel axle bending limit                   | 0.50 mm (0.02 in)  |
| Rear wheel                                 |  |
| Wheel type                                 | Spoke wheel  |
| Rim size                                   | WR250R 18x2.15   |
|  | WR250X 17M/C x MT4.00  |
| Rim material                               | Aluminum   |
| Wheel travel                               | WR250R 270.0 mm (10.63 in)                                     |
| D P 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1    | WR250X 265.0 mm (10.43 in)                                     |
| Radial wheel runout limit                  | 2.0 mm (0.08 in)   |
| Lateral wheel runout limit                 | 2.0 mm (0.08 in)   |
| Wheel axle bending limit                   | 0.50 mm (0.02 in)  |
| Front tire                                 | Media dada   |
| Type                                       | With tube  |
| Size                                       | WR250R 80/100-21M/C 51P  |
| Manufacturar/madal                         | WR250X 110/70R17M/C 54H<br>WR250R BRIDGESTONE/TW-301 F         |
| Manufacturer/model                         | WR250X BRIDGESTONE/TW-501 F WR250X BRIDGESTONE/BT090F RADIAL G |
|  | Wh250X BridgeSTOINE/BT090F RADIAL G                            |
| Rear tire                                  | With tube  |
| Type<br>Size                               | WR250R 120/80-18M/C 62P  |
| 0126                                       | WR250X 140/70R17M/C 66H  |
| Manufacturer/model                         | WR250R BRIDGESTONE/TW-302 F                                    |
| Wandactarenmodel                           | WR250X BRIDGESTONE/BT090R RADIAL G                             |
| Tire air pressure (measured on cold tires) |  |
| Loading condition                          | 0-90 kg (0-198 lb)   |
| Front                                      | WR250R 125 kPa (18 psi) (1.25 kgf/cm <sup>2</sup> )            |
|  | WR250X 200 kPa (29 psi) (2.00 kgf/cm <sup>2</sup> )            |
| Rear                                       | WR250R 175 kPa (25 psi) (1.75 kgf/cm <sup>2</sup> )            |
|  | WR250X 200 kPa (29 psi) (2.00 kgf/cm <sup>2</sup> )            |
| Loading condition                          | 90–185 kg (198–408 lb)   |
| Front                                      | WR250R 150 kPa (22 psi) (1.50 kgf/cm <sup>2</sup> )            |
|  | WR250X 200 kPa (29 psi) (2.00 kgf/cm <sup>2</sup> )            |
| Rear                                       | WR250R 200 kPa (29 psi) (2.00 kgf/cm <sup>2</sup> )            |
|  | WR250X 225 kPa (33 psi) (2.25 kgf/cm <sup>2</sup> )            |
|  |  |

# CHASSIS SPECIFICATIONS

Front brake Type Single disc brake Right hand operation Operation Front brake lever free play 5.0-8.0 mm (0.20-0.31 in) Front disc brake Disc outside diameter × thickness WR250R 250.0  $\times$  3.5 mm (9.84  $\times$  0.14 in) WR250X 298.0  $\times$  4.0 mm (11.73  $\times$  0.16 in) Brake disc thickness limit WR250R 3.0 mm (0.12 in) WR250X 3.5 mm (0.14 in) Brake disc deflection limit 0.15 mm (0.0059 in) Brake pad lining thickness (inner) WR250R 4.8 mm (0.19 in) WR250X 4.0 mm (0.16 in) Limit 1.0 mm (0.04 in) Brake pad lining thickness (outer) WR250R 4.8 mm (0.19 in) WR250X 4.0 mm (0.16 in) Limit 1.0 mm (0.04 in) Master cylinder inside diameter WR250R 11.00 mm (0.43 in) WR250X 12.70 mm (0.50 in) Caliper cylinder inside diameter  $27.00 \text{ mm} \times 2 (1.06 \text{ in} \times 2)$ Recommended fluid DOT 4 Rear brake Type Single disc brake Operation Right foot operation Brake pedal position 11.5 mm (0.45 in) Rear disc brake Disc outside diameter × thickness  $230.0 \times 4.5 \text{ mm} (9.06 \times 0.18 \text{ in})$ 4.0 mm (0.16 in) Brake disc thickness limit Brake disc deflection limit 0.15 mm (0.0059 in) Brake pad lining thickness (inner) 6.4 mm (0.25 in) Limit 1.0 mm (0.04 in) Brake pad lining thickness (outer) 6.4 mm (0.25 in) 1.0 mm (0.04 in) Limit Master cylinder inside diameter 11.0 mm (0.43 in) Caliper cylinder inside diameter 25.40 mm  $\times$  1 (1.00 in  $\times$  1) Recommended fluid DOT 4 Steering Steering bearing type Taper roller bearing Center to lock angle (left) 44.0° Center to lock angle (right) 44.0 ° Front suspension Type Telescopic fork Spring/shock absorber type Coil spring/oil damper Front fork travel 270.0 mm (10.63 in) 450.0 mm (17.72 in) Fork spring free length Limit 441.0 mm (17.36 in) Installed length 439.2 mm (17.29 in) Spring rate K1 4.60 N/mm (26.27 lb/in) (0.47 kgf/mm) Spring stroke K1 0.0-270.0 mm (0.00-10.63 in) Inner tube outer diameter 46.0 mm (1.81 in) 0.2 mm (0.01 in)

No

Inner tube bending limit Optional spring available

# **CHASSIS SPECIFICATIONS**

| Recommended oil                         | Suspension oil 01                                  |
|---|--|
| Quantity                                | 613.0 cm <sup>3</sup> (20.73 US oz) (21.62 Imp.oz) |
| Level                                   | 105.0 mm (4.13 in)                                 |
| Rebound damping adjusting positions     | 100.0 11111 (1.10 111)                             |
| Minimum                                 | 12   |
| Standard                                | 10   |
| Maximum                                 | 1  |
|   | ı  |
| Compression damping adjusting positions | 10   |
| Minimum                                 | 19   |
| Standard                                | 10   |
| Maximum                                 | 1  |
| Rear suspension                         |  |
| Type                                    | Swingarm (link suspension)                         |
| Spring/shock absorber type              | Coil spring/gas-oil damper                         |
| Rear shock absorber assembly travel     | 95.0 mm (3.74 in)                                  |
| Spring free length                      | 220.0 mm (8.66 in)                                 |
| Installed length                        | 211.5 mm (8.33 in)                                 |
| Spring rate K1                          | 80.00 N/mm (456.80 lb/in) (8.16 kgf/mm)            |
| Spring stroke K1                        | 0.0–95.0 mm (0.00–3.74 in)                         |
| Optional spring available               | No   |
| Enclosed gas/air pressure (STD)         | 1200 kPa (170.7 psi) (12.0 kgf/cm <sup>2</sup> )   |
| Spring preload adjusting positions      | 1200 Ki a (170.7 psi) (12.0 kgi/ciii )             |
| Minimum                                 | 010.0 mm (0.50 in)                                 |
|   | 216.0 mm (8.50 in)                                 |
| Standard                                | 211.5 mm (8.33 in)                                 |
| Maximum                                 | 206.0 mm (8.11 in)                                 |
| Rebound damping adjusting positions     |  |
| Minimum                                 | 25   |
| Standard                                | WR250R 12  |
|   | WR250X 13  |
| Maximum                                 | 3  |
| Compression damping adjusting positions |  |
| Minimum                                 | 12   |
| Standard                                | WR250R 10  |
|   | WR250X 7   |
| Maximum                                 | 1  |
|   |  |
| Swingarm                                | 1.0 mm (0.04 in)                                   |
| Swingarm end free play limit (radial)   | 1.0 mm (0.04 in)                                   |
| Swingarm end free play limit (axial)    | 1.0 mm (0.04 in)                                   |
| Drive chain                             |  |
| Type/manufacturer                       | 520V/DAIDO   |
| Link quantity                           | 108  |
| Drive chain slack                       | WR250R 38.0-48.0 mm (1.50-1.89 in)                 |
|   | WR250X 40.0–50.0 mm (1.57–1.97 in)                 |
| 15-link length limit                    | 239.3 mm (9.42 in)                                 |
| <u> </u>                                | •  |

## **ELECTRICAL SPECIFICATIONS**

| ELECTRICAL SPECIFICATIONS         |                              |
|-----------------------------------|------------------------------|
| Voltage                           |                              |
| System voltage                    | 12 V                         |
| Ignition system                   |                              |
| Ignition system                   | TCI (digital)                |
| Advancer type                     | Digital                      |
| Ignition timing (B.T.D.C.)        | 10.0 °                       |
| Engine control unit               |                              |
| Model/manufacturer                | TBDF88/DENSO                 |
| Ignition coil                     |                              |
| Model/manufacturer                | F6T558/MITSUBISHI            |
| Primary coil resistance           | 1.19–1.61 Ω                  |
| Secondary coil resistance         | 8.50–11.50 kΩ                |
| AC magneto                        |                              |
| Model/manufacturer                | F3D7/YAMAHA                  |
| Standard output                   | 14.0 V, 350 W @ 5000 r/min   |
| Stator coil resistance            | 0.168–0.252 Ω (W-W)          |
| Rectifier/regulator               |                              |
| Regulator type                    | Semi conductor-short circuit |
| Model/manufacturer                | SH678-11/SHINDENGEN          |
| No load regulated voltage         | 14.1–14.9 V                  |
| Rectifier capacity (DC)           | 35.0 A                       |
| Withstand voltage                 | 200.0 V                      |
| Battery                           |                              |
| Model                             | YTZ7S                        |
| Voltage, capacity                 | 12 V, 6.0 Ah                 |
| Specific gravity                  | 1.310                        |
| Manufacturer                      | GS YUASA                     |
| Ten hour rate amperage            | 0.60 A                       |
| Headlight                         |                              |
| Bulb type                         | Halogen bulb                 |
| Bulb voltage, wattage × quantity  |                              |
| Headlight                         | 12 V, 60 W/55.0 W            |
| Tail/brake light                  | LED                          |
| Front turn signal/position light  | 12 V, 21.0 W/5.0 W × 2       |
| Rear turn signal light            | 12 V, 21.0 W×2               |
| License plate light               | 12 V, 5.0 W                  |
| Indicator light                   |                              |
| Neutral indicator light           | LED                          |
| Turn signal indicator light       | LED                          |
| High beam indicator light         | LED                          |
| Fuel level warning light          | LED                          |
| Coolant temperature warning light | LED                          |
| Engine trouble warning light      | LED                          |
| Electric starting system          |                              |
| System type                       | Constant mesh                |
|                                   |                              |

## **ELECTRICAL SPECIFICATIONS**

| Starter motor                   |   |
|---------------------------------|---|
| Model/manufacturer              | SM-14/MITSUBA                             |
| Power output                    | 0.50 kW                                   |
| Armature coil resistance        | $0.0040 – 0.0050 \ \Omega$                |
| Brush overall length            | 10.0 mm (0.39 in)                         |
| Limit                           | 3.50 mm (0.14 in)                         |
| Brush spring force              | 7.16–9.52 N (25.77–34.27 oz) (730–971 gf) |
| Commutator diameter             | 28.0 mm (1.10 in)                         |
| Limit                           | 27.0 mm (1.06 in)                         |
| Mica undercut (depth)           | 0.70 mm (0.03 in)                         |
| Starter relay                   |   |
| Model/manufacturer              | A3943-072/JIDECO                          |
| Amperage                        | 180.0 A                                   |
| Coil resistance                 | 4.18–4.62 $\Omega$                        |
| Horn                            |   |
| Horn type                       | Plane                                     |
| Quantity                        | 1 pcs                                     |
| Model/manufacturer              | HF-12/NIKKO                               |
| Maximum amperage                | 3.0 A                                     |
| Coil resistance                 | 1.01–1.11 $\Omega$                        |
| Performance                     | 108–116 dB/2m                             |
| Turn signal relay               |   |
| Relay type                      | Full transistor                           |
| Model/manufacturer              | FE246BH/DENSO                             |
| Built-in, self-canceling device | No  |
| Turn signal blinking frequency  | 75–95 cycles/min                          |
| Starting circuit cut-off relay  |   |
| Model/manufacturer              | G8R-30Y-V4/OMRON                          |
| Coil resistance                 | 162.0–198.0 Ω                             |
| Headlight relay                 |   |
| Model/manufacturer              | ACM33211 M04/MATSUSHITA                   |
| Coil resistance                 | 86.40–105.60 $\Omega$                     |
| Sidestand relay                 |   |
| Model/manufacturer              | G8R-30Y-V4/OMRON                          |
| Fuel pump relay                 |   |
| Model/manufacturer              | G8R-30Y-V4/OMRON                          |
| Coil resistance                 | 162–198 Ω                                 |
| Fan motor relay                 |   |
| Model/manufacturer              | ACM33211 M04/MATSUSHITA                   |
| Fuses                           |   |
| Main fuse                       | 30.0 A                                    |
| Headlight fuse                  | 15.0 A                                    |
| Signaling system fuse           | 10.0 A                                    |
| Ignition fuse                   | 7.5 A                                     |
| Radiator fan fuse               | 7.5 A                                     |
| Fuel injection system fuse      | 7.5 A                                     |
| Backup fuse                     | 7.5 A                                     |
| Spare fuse                      | 30.0 A                                    |

## **ELECTRICAL SPECIFICATIONS**

| Spare fuse | 15.0 A |
|------------|--------|
| Spare fuse | 10.0 A |
| Spare fuse | 7.5 A  |

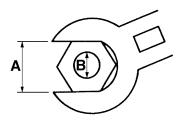
EAS20320

#### **TIGHTENING TORQUES**

FAS20330

# GENERAL TIGHTENING TORQUE SPECIFICATIONS

This chart specifies tightening torques for standard fasteners with a standard ISO thread pitch. Tightening torque specifications for special components or assemblies are provided for each chapter of this manual. To avoid warpage, tighten multi-fastener assemblies in a crisscross pattern and progressive stages until the specified tightening torque is reached. Unless otherwise specified, tightening torque specifications require clean, dry threads. Components should be at room temperature.



- A. Distance between flats
- B. Outside thread diameter

| A (nut)  | B (bolt) | General tightening torques |      |       |  |  |  |
|----------|----------|----------------------------|------|-------|--|--|--|
| A (liut) | D (BOIL) | Nm                         | m•kg | ft•lb |  |  |  |
| 10 mm    | 6 mm     | 6                          | 0.6  | 4.3   |  |  |  |
| 12 mm    | 8 mm     | 15                         | 1.5  | 11    |  |  |  |
| 14 mm    | 10 mm    | 30                         | 3.0  | 22    |  |  |  |
| 17 mm    | 12 mm    | 55                         | 5.5  | 40    |  |  |  |
| 19 mm    | 14 mm    | 85                         | 8.5  | 61    |  |  |  |
| 22 mm    | 16 mm    | 130                        | 13.0 | 94    |  |  |  |

EAS20340

#### **ENGINE TIGHTENING TORQUES**

| Item  | Thread size | Q'ty | Tightening torque           | Remarks               |
|---|-------------|------|-----------------------------|-----------------------|
| Camshaft cap bolt                           | M6          | 8    | 10 Nm (1.0 m•kg, 7.2 ft•lb) |                       |
| Cylinder head straight screw plug           | M12         | 1    | 28 Nm (2.8 m•kg, 20 ft•lb)  |                       |
| Cylinder head stud bolt (exhaust pipe bolt) | M8          | 2    | 15 Nm (1.5 m•kg, 11 ft•lb)  |                       |
| Spark plug                                  | M10         | 1    | 13 Nm (1.3 m•kg, 9.4 ft•lb) |                       |
| Cylinder head bolt                          | M10         | 4    | 40 Nm (4.0 m•kg, 29 ft•lb)  |                       |
| Cylinder head cover bolt                    | M6          | 2    | 12 Nm (1.2 m•kg, 8.7 ft•lb) |                       |
| Cylinder head bolt                          | M6          | 2    | 10 Nm (1.0 m•kg, 7.2 ft•lb) |                       |
| Oil check bolt                              | M8          | 1    | 10 Nm (1.0 m•kg, 7.2 ft•lb) |                       |
| Cylinder head cover bolt (small head)       | M6          | 5    | 10 Nm (1.0 m•kg, 7.2 ft•lb) | -10                   |
| Balancer weight screw                       | M6          | 3    | 10 Nm (1.0 m•kg, 7.2 ft•lb) | -√5                   |
| Balancer gear nut                           | M14         | 1    | 50 Nm (5.0 m•kg, 36 ft•lb)  | lock<br>washer<br>use |
| Rotor nut                                   | M12         | 1    | 65 Nm (6.5 m•kg, 47 ft•lb)  |                       |
| Cam sprocket bolt                           | M7          | 4    | 24 Nm (2.4 m•kg, 17 ft•lb)  |                       |
| Timming chain tensioner bolt                | M6          | 2    | 10 Nm (1.0 m•kg, 7.2 ft•lb) |                       |

| Item                                 | Thread size | Q'ty | Tightening torque           | Remarks               |
|--------------------------------------|-------------|------|-----------------------------|-----------------------|
| Timing chain guide bolt              | M6          | 4    | 10 Nm (1.0 m•kg, 7.2 ft•lb) | -(6)                  |
| Plate (impeller shaft side)          | M6          | 2    | 10 Nm (1.0 m•kg, 7.2 ft•lb) | -15                   |
| Oil filter element cover bolt        | M6          | 3    | 10 Nm (1.0 m•kg, 7.2 ft•lb) |                       |
| Oil pump bolt                        | M6          | 2    | 10 Nm (1.0 m•kg, 7.2 ft•lb) |                       |
| Oil pump cover bolt                  | _           | 1    | 2 Nm (0.2 m•kg, 1.4 ft•lb)  |                       |
| Oil strainer housing bolt            | M6          | 2    | 10 Nm (1.0 m•kg, 7.2 ft•lb) | <b>-</b> (G           |
| Delivery pipe bolt                   | M6          | 1    | 10 Nm (1.0 m•kg, 7.2 ft•lb) | -(G                   |
| Throttle body joint clamp screw      | M5          | 2    | 3 Nm (0.3 m•kg, 2.2 ft•lb)  |                       |
| Air filter clamp screw               | M4          | 1    | 2 Nm (0.2 m•kg, 1.4 ft•lb)  |                       |
| Exhaust pipe nut                     | M8          | 2    | 20 Nm (2.0 m•kg, 14 ft•lb)  |                       |
| Muffler and exhaust pipe             | M8          | 1    | 20 Nm (2.0 m•kg, 14 ft•lb)  |                       |
| Muffler bolt                         | M10         | 2    | 42 Nm (4.2 m•kg, 30 ft•lb)  |                       |
| Muffler protector bolt               | M6          | 3    | 7 Nm (0.7 m•kg, 5.1 ft•lb)  |                       |
| Spark arrester bolt                  | M6          | 3    | 12 Nm (1.2 m•kg, 8.7 ft•lb) |                       |
| EXUP cable pulley double-nut         | M6          | 2    | 6 Nm (0.6 m•kg, 4.3 ft•lb)  |                       |
| EXUP pully bolt                      | M6          | 2    | 10 Nm (1.0 m•kg, 7.2 ft•lb) |                       |
| EXUP servo motor bolt                | M6          | 2    | 6 Nm (0.6 m•kg, 4.3 ft•lb)  |                       |
| EXUP servo motor cover bolt          | M5          | 2    | 2 Nm (0.2 m•kg, 1.4 ft•lb)  |                       |
| Bearing cover plate bolt             | M6          | 6    | 10 Nm (1.0 m•kg, 7.2 ft•lb) | <b>-6</b>             |
| Crankcase bolts                      | M6          | 12   | 10 Nm (1.0 m•kg, 7.2 ft•lb) |                       |
| Crankcase and holder screw           | M6          | 2    | 10 Nm (1.0 m•kg, 7.2 ft•lb) | <b>-</b> (G           |
| Timing mark accessing screw          | M14         | 1    | 2 Nm (0.2 m•kg, 1.4 ft•lb)  |                       |
| Crankshaft end cover                 | M32         | 1    | 2 Nm (0.2 m•kg, 1.4 ft•lb)  |                       |
| Crankcase cover bolt (left)          | M6          | 11   | 10 Nm (1.0 m•kg, 7.2 ft•lb) |                       |
| Crankcase cover bolt (right)         | M6          | 12   | 10 Nm (1.0 m•kg, 7.2 ft•lb) |                       |
| Engine oil drain bolt                | M12         | 1    | 20 Nm (2.0 m•kg, 14 ft•lb)  |                       |
| Crankcase and nozzle bolt            | M6          | 1    | 10 Nm (1.0 m•kg, 7.2 ft•lb) | <b>-</b> ••           |
| Primary drive gear nut               | M16         | 1    | 80 Nm (8.0 m•kg, 58 ft•lb)  | Lock<br>washer<br>use |
| Clutch spring bolts                  | M6          | 5    | 8 Nm (0.8 m•kg, 5.8 ft•lb)  |                       |
| Locknut (push lever adjusting screw) | M6          | 1    | 8 Nm (0.8 m•kg, 5.8 ft•lb)  |                       |
| Clutch boss nut                      | M16         | 1    | 75 Nm (7.5 m•kg, 54 ft•lb)  | Lock<br>washer<br>use |

| Item                            | Thread size | Q'ty | Tightening torque             | Remarks       |
|---------------------------------|-------------|------|-------------------------------|---------------|
| Drive sprocket nut              | M18         | 1    | 95 Nm (9.5 m•kg, 69 ft•lb)    | Stake the nut |
| Stopper screw (stopper lever)   | M8          | 1    | 22 Nm (2.2 m•kg, 16 ft•lb)    | -0            |
| Shift pedal bolt                | M8          | 1    | 18 Nm (1.8 m•kg, 13 ft•lb)    |               |
| Stator assembly bolt            | M6          | 3    | 10 Nm (1.0 m•kg, 7.2 ft•lb)   | -6            |
| Crankshaft position sensor bolt | M6          | 2    | 10 Nm (1.0 m•kg, 7.2 ft•lb)   | -6            |
| Neutral switch                  | M5          | 2    | 4 Nm (0.4 m•kg, 2.9 ft•lb)    | -@            |
| Thermosensor bolt               | M12         | 1    | 18 Nm (1.8 m•kg, 13 ft•lb)    |               |
| Drive sprocket cover bolt       | M6          | 3    | 10 Nm (1.0 m•kg, 7.2 ft•lb)   |               |
| Right side cover bolt           | M6          | 1    | 10 Nm (1.0 m•kg, 7.2 ft•lb)   |               |
| Side cover stay bolt            | M6          | 2    | 10 Nm (1.0 m•kg, 7.2 ft•lb)   |               |
| Cylinder bolt                   | M6          | 2    | 10 Nm (1.0 m•kg, 7.2 ft•lb)   |               |
| Water pump housing cover bolt   | M6          | 3    | 10 Nm (1.0 m•kg, 7.2 ft•lb)   |               |
| Coolant drain bolt              | M6          | 1    | 10 Nm (1.0 m•kg, 7.2 ft•lb)   |               |
| Clutch cable holder bolt        | M6          | 2    | 10 Nm (1.0 m•kg, 7.2 ft•lb)   |               |
| Speed sensor bolt               | M6          | 1    | 10 Nm (1.0 m•kg, 7.2 ft•lb)   |               |
| Radiator hose clamp screw       | _           | 6    | 2 Nm (0.2 m•kg, 1.4 ft•lb)    |               |
| Radiator fan bolt               | M6          | 3    | 8 Nm (0.8 m•kg, 5.8 ft•lb)    |               |
| Radiator                        | M6          | 1/1  | 10 Nm (1.0 m•kg, 7.2 ft•lb)   |               |
| Radiator cover bolt             | M6          | 2    | 10 Nm (1.0 m•kg, 7.2 ft•lb)   |               |
| Thermostat cover bolt           | M6          | 2    | 10 Nm (1.0 m•kg, 7.2 ft•lb)   |               |
| Seat guide screw                | M6          | 2    | 7 Nm (0.7 m•kg, 5.1 ft•lb)    |               |
| Throttle position sensor screw  | M5          | 2    | 3.5 Nm (0.35 m•kg, 2.5 ft•lb) |               |
| Air induction system pipe bolt  | M6          | 2    | 10 Nm (1.0 m•kg, 7.2 ft•lb)   |               |
| Wire harness holder bolt        | M6          | 1    | 10 Nm (1.0 m•kg, 7.2 ft•lb)   |               |

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#### **CHASSIS TIGHTENING TORQUES**

| Item                                     | Thread size | Q'ty | Tightening torque            | Remarks |
|--|-------------|------|------------------------------|---------|
| Engine mounting nut (front upper)        | M10         | 1    | 67 Nm (6.7 m•kg, 48 ft•lb)   |         |
| Engine mounting nut (front, front lower) | M10         | 1/1  | 56 Nm (5.6 m•kg, 41 ft•lb)   |         |
| Down tube nut                            | M12         | 3    | 113 Nm (11.3 m•kg, 82 ft•lb) |         |
| Main frame and rear frame                | M10         | 4    | 56 Nm (5.6 m•kg, 41 ft•lb)   |         |
| Engine protector bolt                    | M6          | 2    | 10 Nm (1.0 m•kg, 7.2 ft•lb)  |         |
| Drive chain tensioner bolt               | M8          | 2    | 23 Nm (2.3 m•kg, 17 ft•lb)   |         |

| Item                             | Thread size | Q'ty | Tightening torque            | Remarks  |
|----------------------------------|-------------|------|------------------------------|----------|
| Taillight cover bolt             | M6          | 4    | 10 Nm (1.0 m•kg, 7.2 ft•lb)  |          |
| Helmet hanger screw              | M6          | 1    | 10 Nm (1.0 m•kg, 7.2 ft•lb)  |          |
| Front fender bolt                | M6          | 4    | 7 Nm (0.7 m•kg, 5.1 ft•lb)   |          |
| Sidecover screw                  | M6          | 2    | 10 Nm (1.0 m•kg, 7.2 ft•lb)  |          |
| Sidecover stay bolt              | M6          | 1    | 10 Nm (1.0 m•kg, 7.2 ft•lb)  |          |
| Horn bolt                        | M6          | 1    | 10 Nm (1.0 m•kg, 7.2 ft•lb)  |          |
| Air scoop stay bolt              | M8          | 2    | 16 Nm (1.6 m•kg, 12 ft•lb)   |          |
| Air scoop bolt                   | M6          | 4    | 7 Nm (0.7 m•kg, 5.1 ft•lb)   |          |
| Air scoop and right air panel    | M6          | 2    | 4 Nm (0.4 m•kg, 2.9 ft•lb)   |          |
| Rectifier/regulator bolt         | M6          | 2    | 7 Nm (0.7 m•kg, 5.1 ft•lb)   |          |
| Recovery tank screw              | M6          | 2    | 7 Nm (0.7 m•kg, 5.1 ft•lb)   |          |
| Starter motor leads nut          | M6          | 2    | 5 Nm (0.5 m•kg, 3.6 ft•lb)   |          |
| Starter motor bolt               | M6          | 1    | 10 Nm (1.0 m•kg, 7.2 ft•lb)  |          |
| Pivot shaft nut                  | M16         | 1    | 85 Nm (8.5 m•kg, 62 ft•lb)   |          |
| Rear shock absorber locknut      | _           | 1    | 42 Nm (4.2 m•kg, 30 ft•lb)   |          |
| Rear shock absorber nut (upper)  | M10         | 1    | 40 Nm (4.0 m•kg, 29 ft•lb)   |          |
| Rear shock absorber nut (lower)  | M10         | 1    | 53 Nm (5.3 m•kg, 38 ft•lb)   |          |
| Frame and connecting rod nut     | M14         | 1    | 80 Nm (8.0 m•kg, 58 ft•lb)   |          |
| Connecting rod and relay arm nut | M14         | 1    | 80 Nm (8.0 m•kg, 58 ft•lb)   |          |
| Relay arm and swing arm nut      | M14         | 1    | 70 Nm (7.0 m•kg, 51 ft•lb)   |          |
| Chain case bolt                  | M6          | 2    | 7 Nm (0.7 m•kg, 5.1 ft•lb)   |          |
| Chain cover bolt                 | M6          | 3    | 7 Nm (0.7 m•kg, 5.1 ft•lb)   |          |
| Sidestand nut                    | M10         | 1    | 64 Nm (6.4 m•kg, 46 ft•lb)   |          |
| Sidestand switch screw           | M5          | 2    | 4 Nm (0.4 m•kg, 2.9 ft•lb)   |          |
| Steering stem nut                | M24         | 1    | 120 Nm (12.0 m•kg, 87 ft•lb) |          |
| Lower ring nut                   | M28         | 1    | -                            | See NOTE |
| Upper bracket pinch bolt         | M8          | 4    | 23 Nm (2.3 m•kg, 17 ft•lb)   |          |
| Lower bracket pinch bolt         | M8          | 4    | 20 Nm (2.0 m•kg, 14 ft•lb)   |          |
| Fuel tank bolt                   | M6          | 4    | 7 Nm (0.7 m•kg, 5.1 ft•lb)   |          |
| Fuel tank bracket bolt           | M6          | 3    | 10 Nm (1.0 m•kg, 7.2 ft•lb)  |          |
| Fuel pump bolt                   | M5          | 6    | 4 Nm (0.4 m•kg, 2.9 ft•lb)   |          |
| Meter nut                        | M5          | 3    | 4 Nm (0.4 m•kg, 2.9 ft•lb)   |          |
| Meter bracket nut                | M6          | 1    | 7 Nm (0.7 m•kg, 5.1 ft•lb)   |          |
| Handlebar upper holder bolt      | M8          | 4    | 28 Nm (2.8 m•kg, 20 ft•lb)   |          |
| Handlebar lower holder nut       | M12         | 2    | 40 Nm (4.0 m•kg, 29 ft•lb)   |          |
| Front fork cap bolt              | M48         | 2    | 30 Nm (30. m•kg, 22 ft•lb)   |          |

| Item                                      | Thread size | Q'ty | Tightening torque             | Remarks             |
|---|-------------|------|-------------------------------|---------------------|
| Front fork base valve                     | M22         | 2    | 55 Nm (5.5 m•kg, 40 ft•lb)    | <b>-©</b>           |
| Front fork axle nut                       | M16         | 1    | 63 Nm (6.3 m•kg, 46 ft•lb)    |                     |
| Front wheel axle pinch bolt               | M8          | 4    | 23 Nm (2.3 m•kg, 17 ft•lb)    |                     |
| Front brake disc bolt (WR250R)            | M6          | 6    | 12 Nm (1.2 m•kg, 8.7 ft•lb)   | -•₫                 |
| Front brake disc bolt (WR250X)            | M8          | 6    | 23 Nm (2.3 m•kg, 17 ft•lb)    | <b>-</b> ( <b>1</b> |
| Spoke (front, rear)                       | BC4         | 72   | 3 Nm (0.3 m•kg, 2.2 ft•lb)    |                     |
| Rear wheel axle nut                       | M20         | 1    | 125 Nm (12.5 m•kg, 90 ft•lb)  |                     |
| Rear brake disc bolt                      | M6          | 6    | 12 Nm (1.2 m•kg, 8.7 ft•lb)   | -10                 |
| Rear wheel sprocket nut                   | M8          | 6    | 35 Nm (3.5 m•kg, 25 ft•lb)    |                     |
| Front brake caliper bolt                  | M8          | 2    | 23 Nm (2.3 m•kg, 17 ft•lb)    |                     |
| Union bolt                                | M10         | 4    | 30 Nm (30. m•kg, 22 ft•lb)    |                     |
| Bleed screw                               | M7          | 2    | 6 Nm (0.6 m•kg, 4.3 ft•lb)    |                     |
| Front caliper support bolt                | M8          | 2    | 17 Nm (1.7 m•kg, 12 ft•lb)    |                     |
| Front caliper pin plug                    | M8          | 1    | 2.5 Nm (0.25 m•kg, 1.8 ft•lb) | WR250X<br>only      |
| Front master cylinder holder bolt         | M6          | 2    | 7 Nm (0.7 m•kg, 5.1 ft•lb)    |                     |
| Front brake lever nut                     | M6          | 1    | 7 Nm (0.7 m•kg, 5.1 ft•lb)    |                     |
| Rear master cylinder bolt                 | M6          | 2    | 10 Nm (1.0 m•kg, 7.2 ft•lb)   |                     |
| Rear caliper protector bolt               | M6          | 2    | 7 Nm (0.7 m•kg, 5.1 ft•lb)    |                     |
| Rear brake caliper support bolt           | M8          | 2    | 17 Nm (1.7 m•kg, 12 ft•lb)    |                     |
| Rear master cylinder bracket bolt         | M8          | 2    | 10 Nm (1.0 m•kg, 7.2 ft•lb)   |                     |
| Passenger footrest bolt (left)            | M8          | 1    | 23 Nm (2.3 m•kg, 17 ft•lb)    |                     |
| Passenger footrest bolt (right)           | M8          | 1    | 30 Nm (30. m•kg, 22 ft•lb)    |                     |
| Drive chain tensioner bolt (upper, lower) | M8          | 2    | 23 Nm (2.3 m•kg, 17 ft•lb)    |                     |
| Drive chain adjuster locknut              | M8          | 1    | 16 Nm (1.6 m•kg, 12 ft•lb)    |                     |
| Front fork protector bolt                 | M6          | 6    | 7 Nm (0.7 m•kg, 5.1 ft•lb)    |                     |
| Seat bolt                                 | M6          | 2    | 7 Nm (0.7 m•kg, 5.1 ft•lb)    |                     |
| Front brake lever adjusting locknut       | M6          | 1    | 4 Nm (0.4 m•kg, 2.9 ft•lb)    |                     |
| Front brake master cylinder cap           | M4          | 2    | 4 Nm (0.4 m•kg, 2.9 ft•lb)    |                     |
| Front brake hose holder bolt              | M6          | 1    | 10 Nm (1.0 m•kg, 7.2 ft•lb)   |                     |
| Rear brake caliper pin plug               | M10         | 1    | 2.5 Nm (0.25 m•kg, 1.8 ft•lb) |                     |
| Rear brake master cylinder lock nut       | M6          | 1    | 12 Nm (1.2 m•kg, 8.7 ft•lb)   |                     |
| Clutch lever holder bolt                  | M5          | 2    | 7 Nm (0.7 m•kg, 5.1 ft•lb)    |                     |
| Brake hose holder nut                     | M6          | 2    | 7 Nm (0.7 m•kg, 5.1 ft•lb)    |                     |
| Damper rod nut                            | M10         | 2    | 15 Nm (1.5 m•kg, 11 ft•lb)    |                     |

| Item                         | Thread size | Q'ty | Tightening torque          | Remarks |
|------------------------------|-------------|------|----------------------------|---------|
| Headlight unit bolt          | M6          | 2    | 7 Nm (0.7 m•kg, 5.1 ft•lb) |         |
| Rear brake hose holder screw | M5          | 5    | 2 Nm (0.2 m•kg, 1.4 ft•lb) |         |
| Front drive chain guide bolt | M6          | 1    | 7 Nm (0.7 m•kg, 5.1 ft•lb) |         |
| Delivery pipe screw          | M6          | 2    | 5 Nm (0.5 m•kg, 3.6 ft•lb) |         |
| Canister cover bolt          | M6          | 4    | 7 Nm (0.7 m•kg, 5.1 ft•lb) |         |

#### NOTE:

- Tighten the lower ring nut with the 38 Nm (3.8 m•kg, 27 ft•lb) torque.
- Turn the front fork to the left and right. The rotation motion must be smooth.
- Fully loosen the lower ring nut, and retighten it with the 7 Nm (0.7 m•kg, 5.1 ft•lb) torque.

EAS20360

#### **LUBRICATION POINTS AND LUBRICANT TYPES**

EAS20370

#### **ENGINE**

| Lubrication points  | Lubrication types |
|---|-------------------|
| Oil seal lips   | <b>-C9-1</b>      |
| O-rings   | <b>-©</b>         |
| Bearings  | <b>⊸</b> €        |
| Camshaft cap bolt head                                    | <b>⊸</b> (E)      |
| Cylinder head bolt threads                                | <b>-</b> M)-1     |
| Camshaft profile, journal                                 |                   |
| Decompression system moving parts                         | <b>⊸</b> (E)      |
| Valve stem, stem end                                      | <b>⊸</b> @        |
| Valve lifter surface                                      | <b>⊸</b> €        |
| Crank assembly (crankshaft pin surface)                   | <b>⊸</b> €        |
| Both sliding surfaces of connecting rod big end           | <b>⊸</b> €        |
| Piston pin surface  | <b>⊸©</b>         |
| Piston surface  | <b>⊸©</b>         |
| Cylinder body inner surface                               | <b>⊸©</b>         |
| Impeller shaft  | <b>-C9-</b>       |
| Oil pump assembly shaft                                   | <b>⊸</b> (€)      |
| Oil pump assembly drain port                              | <b>-C9</b>        |
| Idle gear inner diameter and end, idle gear shaft and end | <b>⊸</b> ©        |
| Throttle body joint                                       | <b>⊸</b> ©        |
| Rotor boss end surface                                    | <b>⊸</b> (€)      |
| Thrust gear surface                                       | <b>⊸</b> €        |
| Starter clutch assembly                                   | <b>⊸</b> (€)      |
| Rotor assembly  | <b>⊸</b> (€)      |
| Shaft surface (crankcase bearings)                        | <b>⊸©</b>         |
| Idle gear-2 inner surface, thrust surfaces                | <b>⊸©</b>         |
| Damper assembly shaft, thrust surfaces                    | <b>⊸©</b>         |

| Lubrication points                          | Lubrication types                                 |
|---|---|
| Push rod 1 surface, end                     | <b>⊸</b> (E)                                      |
| Ball (push rod)                             | <b>⊸</b> €  |
| Primary driven gear assembly, inner surface | ⊸(E)  |
| Push lever assembly end                     | <b>⊸</b> €  |
| Transmission gears (wheel and pinion)       | <b>–</b> @  |
| Main axle and drive axle                    | <b>–</b>  |
| Shift drum                                  | <b>⊸</b> €  |
| Shift fork and shift fork guide bars        | <b>⊸</b> €  |
| Shift shaft                                 | <b>⊸</b> €  |
| Shift shaft washer, spacer inner surface    | <b>⊸</b> €  |
| Cylinder head cover gasket                  | Yamaha bond No. 1215<br>(Three Bond No.<br>1215®) |
| Cylinder head semicircular surface          | Yamaha bond No. 1215<br>(Three Bond No.<br>1215®) |
| Crankcase mating surface                    | Yamaha bond No. 1215<br>(Three Bond No.<br>1215®) |
| Stator assembly lead grommet                | Yamaha bond No. 1215<br>(Three Bond No.<br>1215®) |

EAS20380

#### **CHASSIS**

| Lubrication points                              | Lubrication types |
|---|-------------------|
| Upper bearings and oil seal lip (steering head) |                   |
| Lower bearings and oil seal lip (steering head) |                   |
| Handle lower holder threads                     |                   |
| Front wheel oil seal (left/right)               |                   |
| Rear wheel oil seal (left/right)                | <b>-</b>          |
| Brake pedal bolt, boss                          | <b>-</b> (s)-     |
| Throttle cable end and throttle grip            | <b>-</b>          |
| Throttle cable housing inner surface            | <b>-</b> (s)-(    |
| Throttle cable                                  | <b>-</b> (s)-     |

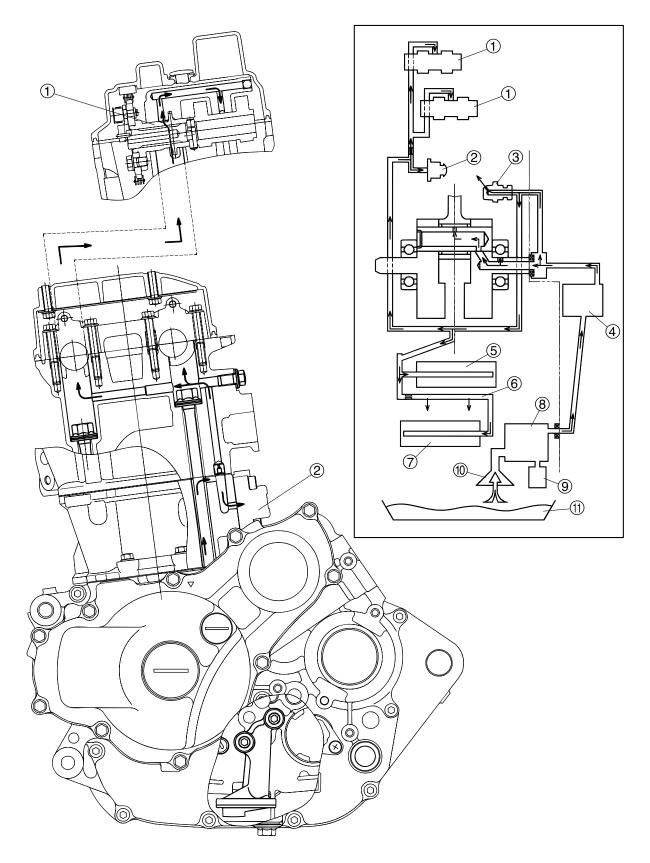
| Lubrication points                                      | Lubrication types       |
|---|-------------------------|
| Brake lever bolt  | <b>-</b> (S)-           |
| Brake lever and front brake master cylinder             | <b>-</b> (S)-1          |
| Adjusting screw (brake lever)                           | <b>—</b> (S) <b>—</b> ( |
| Rear brake master cylinder push rod (boot mount groove) | <b>-</b> (3)-1          |
| Brake caliper piston seal                               | <b>⊸</b> ( <b>B</b> F   |
| Brake caliper dust seal                                 | <b>-</b> (S)-           |
| Brake caliper support bolt                              | <b>-</b> (S)-(          |
| Brake pad support bolt                                  | <b>-</b> (S) <b>-</b> ( |
| Clutch lever cable                                      |                         |
| Clutch lever bolt                                       |                         |
| Clutch lever  |                         |
| Pivot shaft   |                         |
| Swing arm bearing, collar, spacer, and oil seal         |                         |
| Relay arm bearing, collar, and oil seal                 | <b>-C9-1</b>            |
| Connecting rod bearing, collar and oil seal             | <b>-C9-</b>             |
| Connecting rod bolt                                     | <b>-C9-</b>             |
| Rear shock absorber assembly lower bolt                 | -49-4                   |
| Rear wheel axle   |                         |
| Sidestand switch  | -(3)-1                  |
| Sidestand bracket and sidestand                         | <b>-C9-</b>             |
| Sidestand spring and link                               |                         |
| Sidestand bolt collar                                   | <b>-C9-</b>             |
| Drive chain tensioner roller collar (upper)             |                         |

EAS20390

#### **LUBRICATION SYSTEM CHART AND DIAGRAMS**

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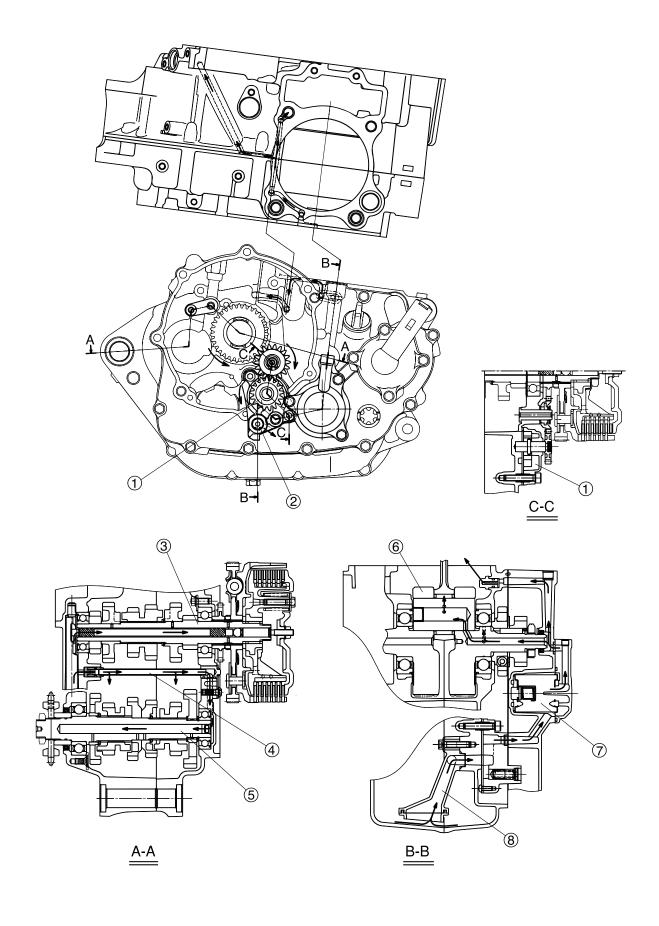
#### **LUBRICATION DIAGRAMS**



### **LUBRICATION SYSTEM CHART AND DIAGRAMS**

- 1. Camshaft
- 2. Timing chain tensioner
- 3. Piston cooler
- 4. Oil filter
- 5. Main axle
- 6. Delivery pipe
- 7. Drive axle
- 8. Oil pump
- 9. Relief valve
- 10. Oil strainer
- 11. Oil pan

### **LUBRICATION SYSTEM CHART AND DIAGRAMS**

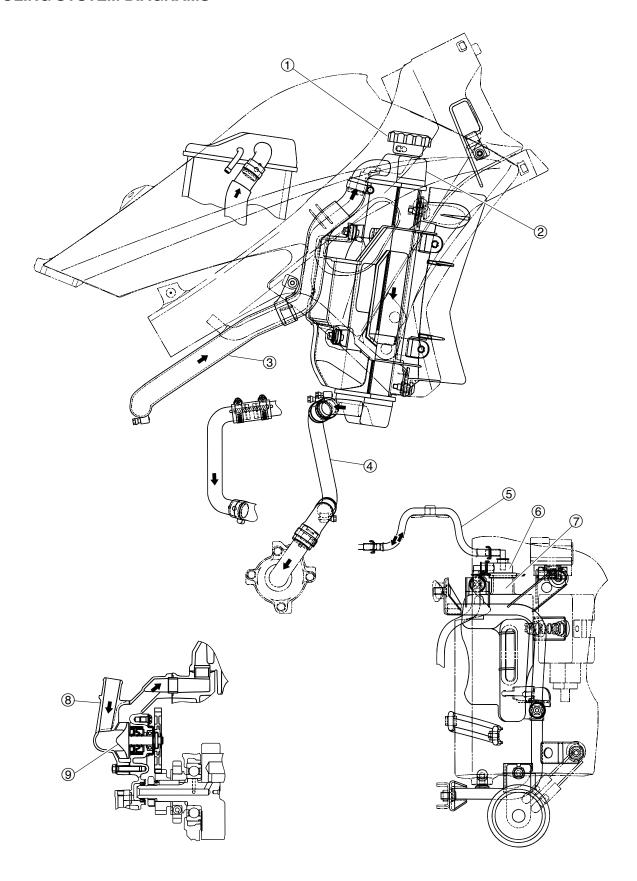


### **LUBRICATION SYSTEM CHART AND DIAGRAMS**

- 1. Oil pump assembly
- 2. Relief valve
- 3. Main axle
- 4. Delivery pipe
- 5. Drive axle
- 6. Crankshaft
- 7. Oil filter
- 8. Oil strainer

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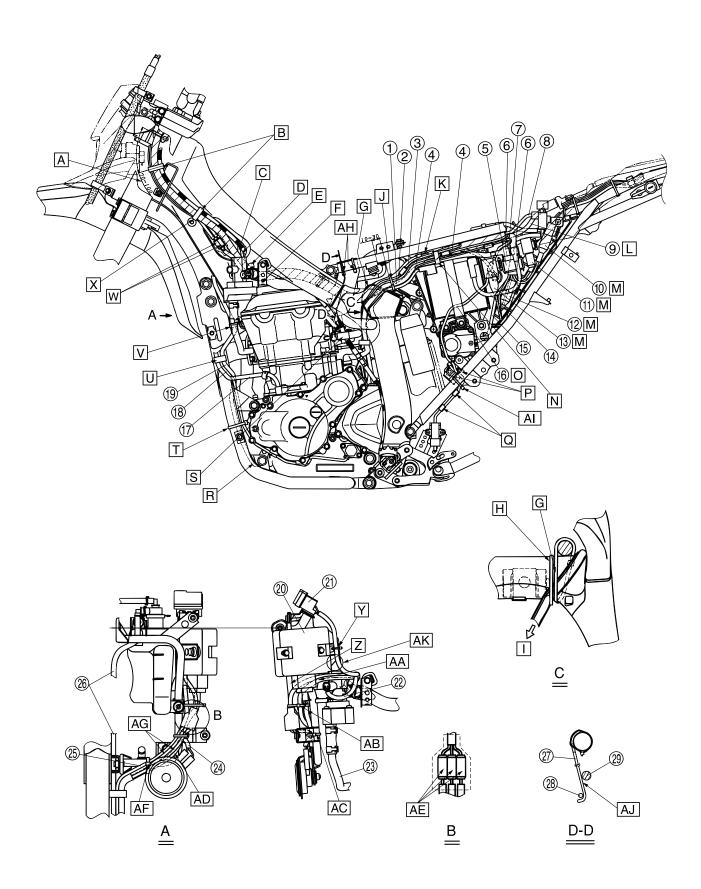
#### **COOLING SYSTEM DIAGRAMS**



### **COOLING SYSTEM DIAGRAMS**

- 1. Radiator cap
- 2. Radiator
- 3. Radiator inlet hose
- 4. Radiator outlet hose
- 5. Recovery tank hose
- 6. Cap
- 7. Side cover stay
- 8. Water pump housing cover
- 9. Impeller shaft

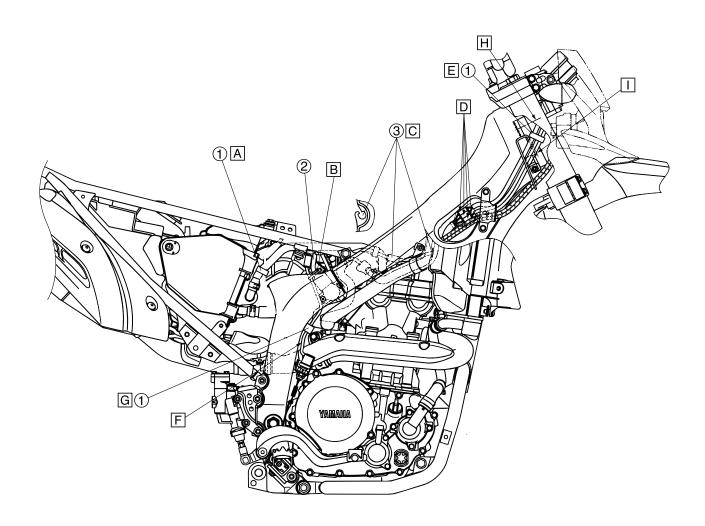
#### **CABLE ROUTING**



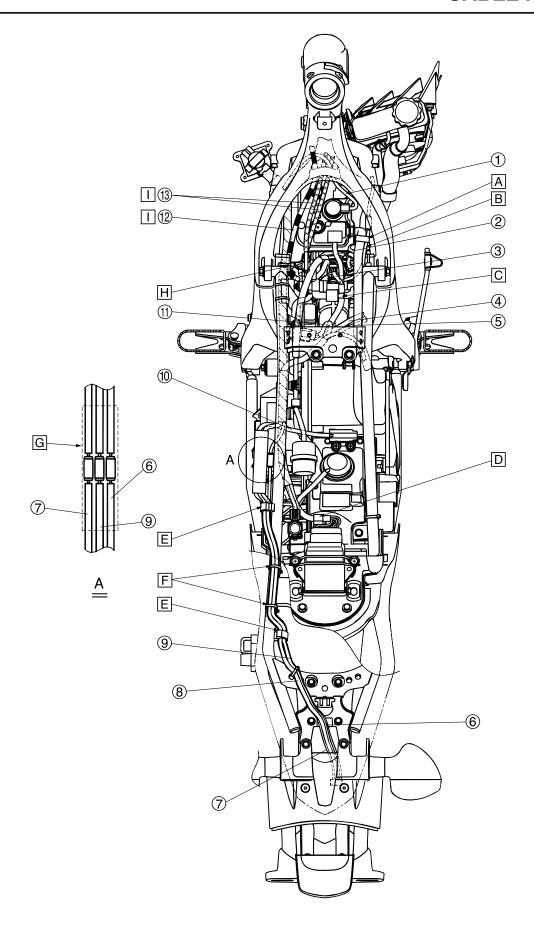
#### **CABLE ROUTING**

- Starter motor lead
- 2. Coolant temperature sensor lead
- Speed sensor lead
- 4. Negative battery lead
- Starter relay
- 6. Starter relay probe
- 7. Starter relay lead
- 8. Intake solenoid lead
- 9. ECU lead
- 10. Headlight relay
- 11. Turn signal relay
- 12. Radiator fan motor relay
- 13. Relay unit
- 14. Positive battery lead
- 15. EXUP servo motor lead
- 16. Sidestand switch lead
- 17. AC magneto lead
- 18. Neutral switch lead
- 19. Recovery tank hose
- 20. Rectifier/regulator
- 21. Fuse box
- 22. Air cut-off valve lead
- 23. Air induction system pipe
- 24. Horn lead
- 25. Neutral switch lead
- 26. Recovery tank hose
- 27. Cover
- 28. Clutch cable
- 29. Wire harness
- A. Dimensions of wire harness fastening.
- B. Fasten the wire harness, clutch cable, clutch switch lead, and left handlebar switch lead using a cable tie. Place the clutch cable at the top position. The others can be in any position.
- C. Route the wire harness under the clutch cable, above the throttle cable, and along the right side of vehicle.
- Pass the ignition lead under the clutch cable, above the throttle cable, and through the hole inside of frame tank rail.
- E. Wire harness branch (at left side of vehicle) connected to the fuse box, AC magneto and others.
- F. Securely insert the wire harness clamp into the T-stud of cable holder.
- G. Fasten the wire harness, starter motor lead, negative battery lead, coolant temperature sensor lead, and speed sensor lead to the frame with a cable tie.
- H. Fasten the starter motor lead, negative battery lead, coolant temperature sensor lead, and speed sensor lead to the frame with a cable tie. Fasten them to the outside of RCU mounting boss (left).
- I. To engine.
- J. Fasten the wire harness, starter motor lead, negative battery lead, coolant temperature sensor lead, and speed sensor lead using a cable tie.
- K. Securely insert the wire harness clamp into the T-stud of the rear frame.

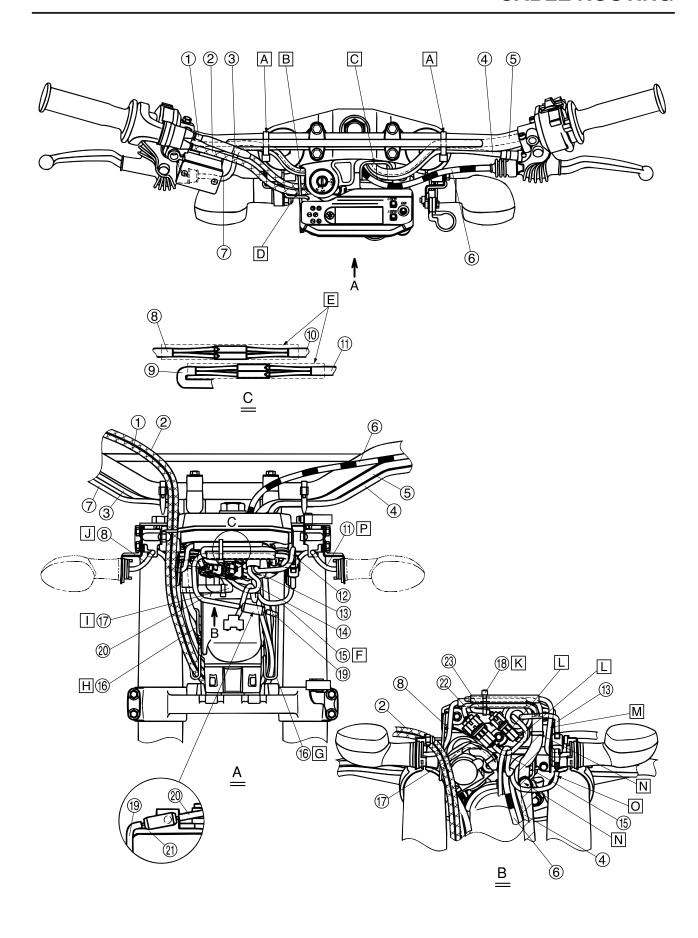
- Pass the ECU lead between the intake solenoid hose and connector.
- M. Wrap the connectors with a cover for protection.
- N. Fasten the starter motor lead, negative battery lead, coolant temperature sensor lead, and speed sensor lead using a cable tie. Fasten them between the battery band and battery terminals, and face their cable lock inward.
- Route the sidestand switch lead to the inside of battery band.
- P. Fasten the rear frame and sidestand switch lead using a cable tie.
- Q. Fasten the rear frame, sidestand switch lead using a cable tie. They must be fixed to the T-stud of the rear frame. Any locking position can be used.
- R. Position the recovery tank hose end between the engine bracket and down tube.
- S. Pass the clutch cable through the inside of FID hose.
- T. Fasten the neutral switch lead, and recovery tank hose to the down tube with a cable tie. An excess must face inward.
- U. Fasten the AC magneto lead, neutral switch lead, and recovery tank hose to the down tube with a cable tie. They must be fixed to the T-stud of down tube. Any locking position can be used.
- V. Fasten the recovery tank hose to the down tube with clamps. They must be fixed to the T-stud of down tube. Any locking position can be used.
- W. After cable connection, place the connectors in the cover, and mount them in a hole of the frame
- X. Clamp the wire harness, clultch cable and clutch switch lead (6-pin natural color) at the top of sidecover stay mount boss.
- Fix the fuse box lead to the side cover stay.
- Pass the AC magneto lead and neutral switch lead through the behind of rectifier regulator.
- AA. Pass the horn lead through the behind of rectifier regulator.
- AB. Fasten the magneto lead, horn lead, and the top of cover (for AC magneto lead and neutral switch lead) using a cable tie. An excess must face inward. (The bare conductors of lead can be clamped.)
- AC. Fasten the sidecover stay, AC magneto lead, neutral switch lead, and horn lead using a cable tie. An excess must face forward.
- AD. The AC magneto lead and neutral switch lead must not contact with the horn.
- AE. After connecting the AC magneto lead and neutral switch lead, place their connectors in the cover.
- AF. Fasten the sidecover stay, AC magneto lead, and neutral switch lead using a cable tie.
- AG. Rotate the AC magneto lead to the cover.
- AH. Fasten the rear frame cover using a cable tie. The clamp lock must face downwards.
- Al. Fasten the sidestand switch lead to the rear frame with a cable tie. Pass the lead through the hole of rear frame bracket, and direct the clamp lock to the inside of the frame.
- AJ. Install the cover between of the wire harness (inside) and clutch cable (outside).
- AK. Do not route the AC magneto lead, neutral switch lead, horn lead and air induction lead above the air cut-off valve assembly.



- 1. Clamp
- 2. Throttle position sensor lead
- 3. Fan motor lead
- A. Fasten the breather hose using a clamp.
- B. Fasten the throttle position sensor connector cover and the rear brake switch lead using a cable tie.
- C. Insert the fan motor lead into the concave section of guide air, and pass them backward through the hole.
- D. After connecting the main switch lead, front brake switch lead, and handlebar right lead, and place their connectors in the cover.
- E. Fasten the main switch lead, front brake switch lead, and handlebar switch right lead using a clamp. They must be placed between the front edge of the cable guide and below the "H", within the range of the handlebar turns from straight ahead to the fully left.
- F. Slightly pull out the end of rear brake switch lead backward.
- G. Fasten the rear brake switch lead to the frame with a clamp. The clamp must be securely inserted into the frame hole. Any locking position can be used.
- H. The position is a between the halfway from the cable guide and the upperend of the frame number.
- I. Front edge of the cable guide



- 1. Ignition coil lead
- 2. Fuel pump lead
- 3. Injector lead
- 4. Throttle position sensor lead
- 5. Rear brake switch lead
- 6. Right rear turn signal light lead
- 7. License plate light lead
- 8. Taillight lead
- 9. Left rear turn signal light lead
- 10. Lean angle sensor lead
- 11. Intake air pressure sensor lead
- 12. Clutch cable
- 13. Throttle cable
- A. Fasten the radiator fan motor lead and breather hose using a clamp. The rightmost end of breather hose must be secured (to the front as much as possible).
- B. Pass the radiator fan motor lead under the breather hose, and pull them out.
- C. Pass the injector lead between the fuel pipe.
- D. Fasten the ECU lead using a clamp.
- E. Fasten the right and rear left turn signal light lead, license plate light lead, and taillight lead to the rear frame with a clamp.
- F. Fasten the right and left rear turn signal light lead, license plate light lead, and taillight lead to the rear frame with a cable tie.
- G. After connection of lead, place the connector in the cover so that bare conductors are not exposed.
- H. Fasten the frame cover, wire harness, and clutch cables to the frame with a cable tie.
- A silicone hydrate can be applied when passing the clutch cable or throttle cable through the internal hole of frame tank rails.

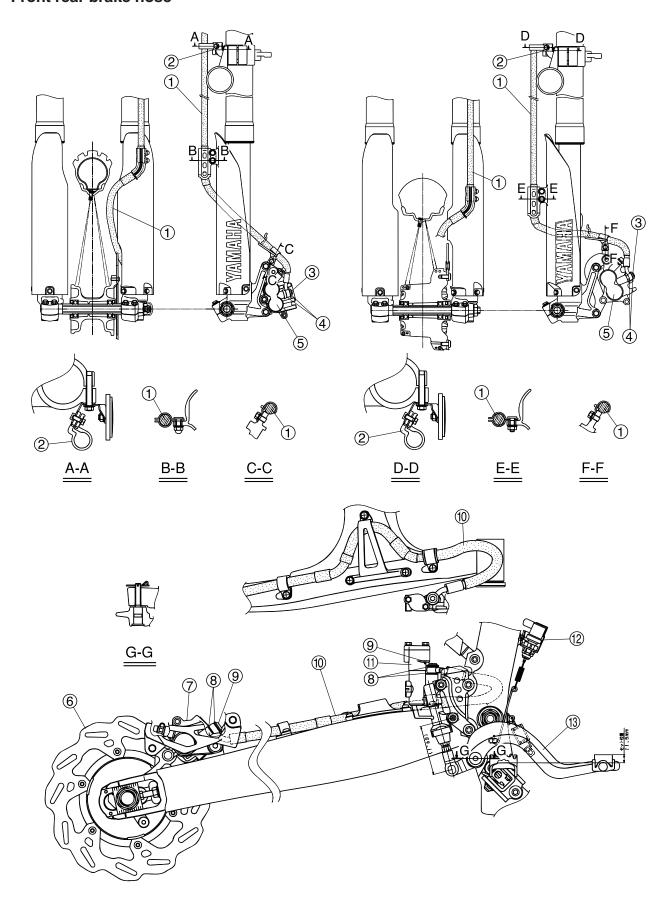


#### CABLE ROUTING

- 1. Throttle cable (accelerator)
- 2. Throttle cable (decelerator)
- 3. Right handlebar switch lead
- 4. Clutch switch lead
- Left handlebar switch lead
- Clutch cable
- 7. Front brake switch lead
- 8. Left front turn signal light lead
- 9. Wire harness (brown connector)
- 10. Wire harness (green connector)
- 11. Left front turn signal light lead
- 12. Meter lead (3-pin black coupler)
- 13. Meter lead (4-pin natural color coupler)
- 14. Meter lead (3-pin natural color coupler)
- 15. Left handlebar switch lead (headlight lead)
- 16. Cable guide
- 17. Main switch lead
- 18. Clamp
- 19. Auxiliary light lead
- 20. Wire harness (2-pin natural color coupler)
- 21. Stopper (headlight stay)
- 22. Wire harness (3-pin natural color coupler)
- 23. Wire harness (4-pin natural color coupler)
- A. Clamp near the end of bent handlebar section using a clamp.
- B. Route the handlebar switch right lead and front brake switch lead through the side of main switch, and extend to the side of head pipe.
- C. Place the clutch cable in the right position. The others can be in any position.
- Pass the throttle cable between the cable guides of right turn signal light stay and meter stay
- E. Place the lead in the hose so that bare conductors are not exposed.
- F. Pass the left handlebar switch lead above the meter lead (3-pin natural color coupler) as shown, and connect them to the headlight assembly.
- G. Pass the wire harness, clutch cable, clutch switch lead and handlebar switch left lead through the wire guide. Route the clutch cable in the top position. The others can be in any position.
- H. Pass the throttle cable, front brake switch lead, right handlebar switch lead, and main switch lead through the wire guide. Place the throttle cable in the top position. The others can be in any position.
- Route the main switch lead upward to the side of head pipe. Do not route the main switch lead to the outside of meter stay cable guide.
- J. Pass the right front turn signal light lead through headlight cowling stay as shown, and then through the inside of meter stay cable guide from behind the throttle cable, and connect them inside of the meter.
- K. Fasten the right and left front turn signal light lead and wire harnesses using a cable tie. Insert the cable tie into the meter stay, and face the lock downward. Cut and remove an excess if any.
- Insert the meter lead (3-pin natural color coupler) under the meter stay, and connect them.

- M. Route the left front turn signal light lead above the meter lead from behind the handlebar switch left lead, and connect them at the meter position.
- Insert the wire harness clamps by inserting the two harness clamps into the hole of the meter stay.
- Install the left handlebar switch lead by inserting them into the space at the side of meter stay.
- P. Pass the front left turn signal light lead through headlight cowling stay as shown, and then through the abobe of meter lead (3-pin black) from behind the handlebar switch lead (3-pin black), and connect them inside of the meter.

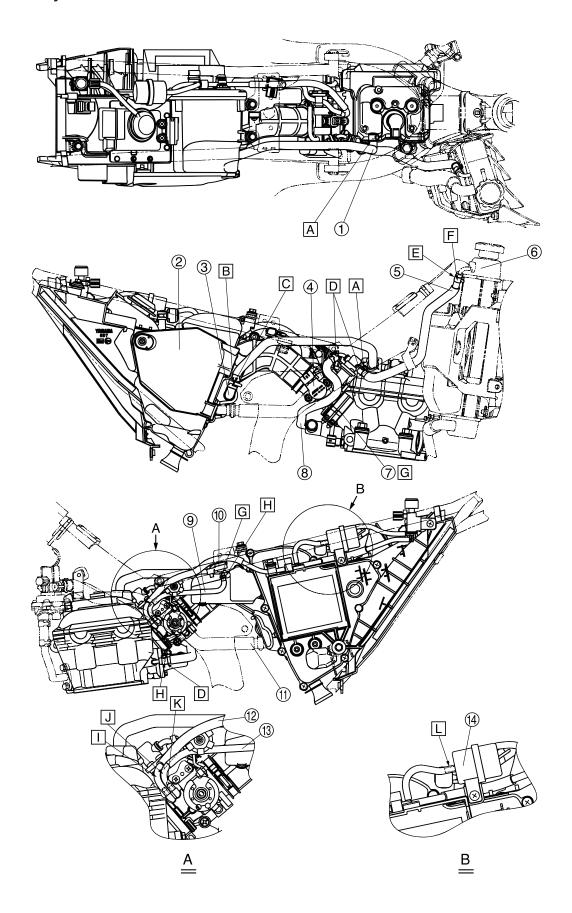
#### Front rear brake hose



## Front rear brake hose

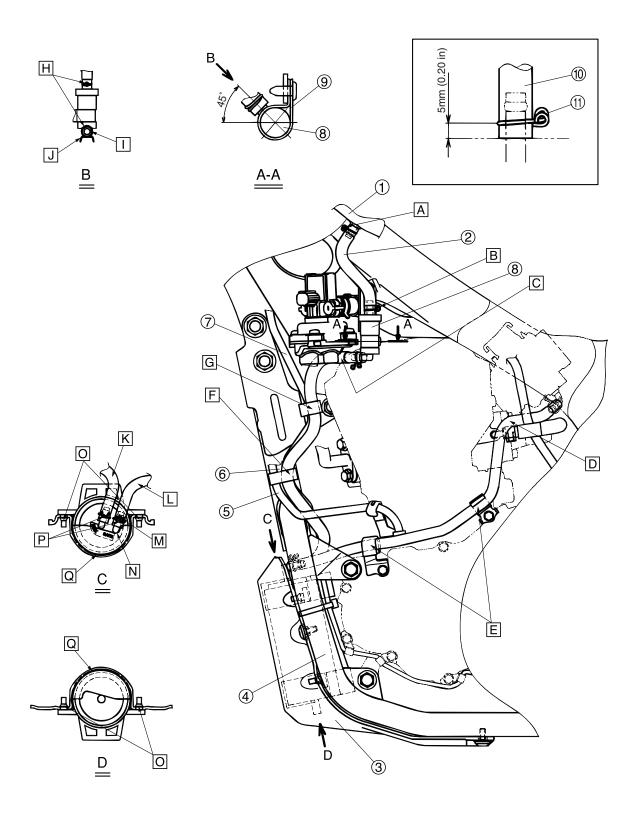
- 1. Front brake hose
- 2. Hose guide
- 3. Union bolt
- 4. Copper washer
- 5. Front brake caliper assembly
- 6. Rear brake disc
- 7. Rear brake caliper assembly
- 8. Copper washer
- 9. Union bolt
- 10. Rear brake hose
- 11. Rear brake master cylinder
- 12. Rear brake switch
- 13. Brake pedal

## Throttle body



- 1. Breather hose
- 2. Air filter case assembly
- 3. Pipe
- 4. Throttle body assembly
- 5. Radiator inlet hose
- 6. Radiator
- 7. Throttle body joint
- 8. FID hose
- 9. Vacuum hose
- 10. Pressure sensor
- 11. Bend hose
- 12. ITS boost hose
- 13. Air induction system hose
- 14. Surge tank
- A. Face the white paint upward of the vehicle.
- B. Face the white paint mark to the right side of vehicle.
- C. Face the clip holder to the right front of vehicle.
- D. Face the clip holder upward of the vehicle.
- E. Face the white paint mark backward of the vehicle.
- F. Face the clip holder to the front side of vehicle.
- G. Align the throttle body joint with the hose clamp.
- H. Face the white paint mark to the left side of vehicle
- Insert the IST boost hose into position until it is stopped.
- Install the vacuum hose to the air-filter case until it is stopped.
- K. Face the yellow paint mark to the left of vehicle.
- L. Connect the tank surge hose until it is stopped.

### **Canister (for California)**



- 1. Fuel tank
- 2. Hose (Fuel tank-roll over valve)
- 3. Canister cover
- 4. Canister
- 5. A.C. magneto lead
- 6. Neutral switch lead
- 7. Recovery tank hose
- 8. Roll over valve
- 9. Holder
- 10. Hose
- 11. Clip
- A. Face the clip end forward of the vehicle.
- B. Face the clip end backward of the vehicle.
- C. Pass the hose (roll over valve–canister) between the engine head and air cut-off valve assembly.
- D. Route the hose (canister–throttle body) to the up side of the FID hose, and then route it to the inside the clutch wire.
- E. Hold the hose (canister–throttle body) through the 2 clamps securely.
- F. Fasten the A.C. magneto lead, neutral switch lead, recovery tank hose, and the hose (roll over valve–canister) using the clamp. Install the clamp to T stud of the down tube securely.
- G. Fasten the recovery tank hose and the hose (roll over–canister). Install the clamp to T stud of the down tube. Face the lock part forward of the vehicle.
- H. Align the paint mark with the projection of the bottom of the roll over valve.
- I. Face the paint leftward of the vehicle.
- J. Face the clip end downward of the vehicle.
- K. From the roll over valve.
- L. To the throttle body.
- M. Face the paint upward of the vehicle.
- N. Align the slot of the damper with the pipe of the throttle body side.
- Insert the projection of the canister damper to the hole of canister cover.
- P. Face the clip end upward of the vehicle.
- Q. When the canister cover install, you may spread the soapy water to the damper as shown. However, do not spread the soapy water to the projection of the damper and the hole of the canister cover.

# PERIODIC CHECKS AND ADJUSTMENTS

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#### PERIODIC MAINTENANCE

FAS20460

#### INTRODUCTION

This chapter includes all information necessary to perform recommended checks and adjustments. If followed, these preventive maintenance procedures will ensure more reliable vehicle operation, a longer service life and reduce the need for costly overhaul work. This information applies to vehicles already in service as well as to new vehicles that are being prepared for sale. All service technicians should be familiar with this entire chapter.

EAS17580

## Periodic maintenance chart for the emission control system

|   |          | ITEM  | ROUTINE   | INITIAL ODOMETER READINGS            |  |          |    |   |          |
|---|----------|---|---|--------------------------------------|--|----------|----|---|----------|
| N | lo.      |   |   | 600 mi<br>(1000 km)<br>or<br>1 month | 4000 mi<br>(6000 km)<br>or<br>6 months | or       | or | 13000 mi<br>(21000 km)<br>or<br>24 months | or       |
| 1 | *        | Fuel line   | <ul><li>Check fuel hoses for cracks<br/>or damage.</li><li>Replace if necessary.</li></ul>  |                                      | V                                      | V        | V  | V   | √        |
| 2 |          | Spark plug  | <ul> <li>Check condition.</li> <li>Adjust gap and clean.</li> <li>Replace at 7000 mi (11000 km) or 12 months and thereafter every 6000 mi (10000 km) or 12 months.</li> </ul> |                                      | ٧                                      | Replace. | V  | Replace.                                  | <b>V</b> |
| 3 |          | Spark arrester  | Clean.  |                                      | <b>V</b>                               | √        | V  | V   | √        |
| 4 | *        | Valve clearance   | <ul> <li>Check and adjust valve<br/>clearance when engine is<br/>cold.</li> </ul>   | Every 26600 mi (42000 km)            |  |          |    |   |          |
| 5 | <b>*</b> | Crankcase breather system                                 | <ul><li>Check breather hose for cracks or damage.</li><li>Replace if necessary.</li></ul>   |                                      | V                                      | V        | V  | V   | √        |
| 6 | *        | Exhaust system  | <ul> <li>Check for leakage.</li> <li>Tighten if necessary.</li> <li>Replace gasket(s) if necessary.</li> </ul>  |                                      | V                                      | V        | V  | V   | V        |
| 7 |          | Evaporative emission control system (For California only) | <ul><li>Check control system for<br/>damage.</li><li>Replace if necessary.</li></ul>  |                                      |  | V        |    | V   |          |
| 8 | 1^       | Air induction sys-<br>tem                                 | <ul> <li>Check the air cut-off valve, reed valve, and hose for damage.</li> <li>Replace any damaged parts.</li> </ul>   |                                      |  | V        |    | V   |          |

<sup>\*</sup> Since these items require special tools, data and technical skills, have a Yamaha dealer perform the service.

EAS32164

## General maintenance and lubrication chart

|   |            |                          |   | INITIAL  |          | ODON                        | IETER REA | DINGS     |           |
|---|------------|--------------------------|---|--|----------|-----------------------------|-----------|-----------|-----------|
| No  | <b>)</b> . | ITEM                     | ROUTINE   | 600 mi<br>(1000 km)<br>or  | or       | 7000 mi<br>(11000 km)<br>or | or        | or        | or        |
|   |            |                          |   | 1 month  | 6 months | 12 months                   | 18 months | 24 months | 30 months |
| 1 *   | *          | Air filter element       | <ul><li>Clean with solvent.</li><li>Replace if necessary.</li></ul>   |  | √        | √                           | √         | √         | √         |
| 2 *   | *          | Clutch                   | <ul><li>Check operation.</li><li>Adjust or replace cable.</li></ul>   | V  | V        | √                           | V         | V         | √         |
| 3 *   | *          | Front brake              | <ul> <li>Check operation, fluid level,<br/>and for fluid leakage.</li> <li>Adjust brake lever free play<br/>and replace brake pads if<br/>necessary.</li> </ul> | V  | V        | V                           | V         | V         | V         |
| 4 *   | *          | Rear brake               | <ul> <li>Check operation, fluid level,<br/>and for fluid leakage.</li> <li>Replace brake pads if necessary.</li> </ul>  | V  | V        | V                           | V         | V         | V         |
| 5 * Brake hose   Check for cracks or damage.   Replace.   ✓ ✓ ✓ ✓   Every 4 years |            | Proko hogo               | Check for cracks or damage.   |  | √        | √                           | √         | √         | √         |
|   |            | 4 years                  |   |  |          |                             |           |           |           |
| 6 *   | *          | Wheels                   | <ul><li>Check runout, spoke tight-<br/>ness and for damage.</li><li>Tighten spokes if necessary.</li></ul>  |  | V        | V                           | V         | V         | V         |
| 7 *   | *          | Tires                    | <ul> <li>Check tread depth and for damage.</li> <li>Replace if necessary.</li> <li>Check air pressure.</li> <li>Correct if necessary.</li> </ul>                |  | <b>V</b> | V                           | V         | V         | ٧         |
| 8 *   | *          | Wheel bearings           | <ul><li>Check bearings for smooth operation.</li><li>Replace if necessary.</li></ul>  |  | <b>V</b> | √                           | <b>V</b>  | <b>V</b>  | <b>V</b>  |
| 9 *   |            | Swingarm pivot bearings  | <ul> <li>Check bearing assemblies<br/>for looseness.</li> </ul>   |  | √        | <b>V</b>                    | V         | √         | <b>V</b>  |
| 10  |            | Drive chain              | <ul> <li>Check chain slack, alignment and condition.</li> <li>Adjust and lubricate chain with a special O-ring chain lubricant thoroughly.</li> </ul>           | Every 300 mi (500 km) and after washing the motorcycle or riding in the rain |          |                             |           |           |           |
| 11 *  | *          | Steering bearings        | <ul> <li>Check bearing assemblies<br/>for looseness.</li> <li>Moderately repack with lith-<br/>ium-soap-based grease.</li> </ul>                                | V  | V        | V                           | V         | Repack.   | V         |
| 12*   | *          | Chassis fasteners        | <ul><li>Check all chassis fitting and fasteners.</li><li>Correct if necessary.</li></ul>  |  | <b>V</b> | <b>V</b>                    | <b>V</b>  | <b>V</b>  | <b>V</b>  |
| 13  |            | Brake lever pivot shaft  | Apply silicone grease lightly.  |  | V        | V                           | √         | √         | <b>V</b>  |
| 14  |            | Brake pedal pivot shaft  | <ul> <li>Apply lithium-soap-based<br/>grease lightly.</li> </ul>  |  | <b>√</b> | √                           | √         | √         | √         |
| 15  |            | Clutch lever pivot shaft | <ul> <li>Apply lithium-soap-based grease lightly.</li> </ul>  |  | V        | V                           | V         | V         | 1         |

|      | ITEM                            |   | INITIAL                              | INITIAL ODOMETER READINGS              |  |    |   |          |
|------|---------------------------------|---|--------------------------------------|--|--|----|---|----------|
| No.  |                                 | ROUTINE   | 600 mi<br>(1000 km)<br>or<br>1 month | 4000 mi<br>(6000 km)<br>or<br>6 months | 7000 mi<br>(11000 km)<br>or<br>12 months | or | 13000 mi<br>(21000 km)<br>or<br>24 months | or       |
| 16   | Sidestand pivot                 | <ul><li>Check operation.</li><li>Apply lithium-soap-based grease lightly.</li></ul>   |                                      | V                                      | V  | V  | V   | V        |
| 17*  | Sidestand switch                | <ul> <li>Check operation and replace<br/>if necessary.</li> </ul>   | V                                    | V                                      | V  | V  | <b>V</b>                                  | <b>V</b> |
| 18*  | Front fork                      | <ul><li>Check operation and for oil leakage.</li><li>Replace if necessary.</li></ul>  |                                      | V                                      | V  | V  | V   | <b>V</b> |
| 19*  | Shock absorber assembly         | <ul><li>Check operation and for oil leakage.</li><li>Replace if necessary.</li></ul>  |                                      | V                                      | √  | V  | <b>V</b>                                  | <b>V</b> |
| 20 * | Rear suspension link pivots     | <ul><li>Check operation.</li><li>Correct if necessary.</li></ul>  |                                      |  | V  |    | <b>V</b>                                  |          |
| 21   | Engine oil                      | <ul> <li>Change (warm engine<br/>before draining).</li> </ul>   | V                                    | V                                      | √  | V  | √   | <b>V</b> |
| 22   | Engine oil filter ele-<br>ment  | Replace.  | V                                    |  | √  |    | √   |          |
| 23*  | * Cooling system                | <ul><li>Check hoses for cracks or<br/>damage.</li><li>Replace if necessary.</li></ul>   |                                      | V                                      | V  | V  | V   | <b>V</b> |
| 23   |                                 | <ul> <li>Change with ethylene glycol<br/>anti-freeze coolant every 24<br/>months.</li> </ul>  |                                      |  |  |    | Change.                                   |          |
| 24 * | Front and rear brake switches   | Check operation.  | V                                    | V                                      | √  | V  | √   | V        |
| 25*  | Control cables                  | <ul> <li>Apply Yamaha chain and<br/>cable lube or engine oil SAE<br/>10W-30 thoroughly.</li> </ul>  | V                                    | V                                      | V  | V  | V   | <b>V</b> |
| 26*  | Throttle grip housing and cable | <ul> <li>Check operation and free play.</li> <li>Adjust the throttle cable free play if necessary.</li> <li>Lubricate the throttle grip housing and cable.</li> </ul> |                                      | V                                      | ٧  | V  | ٧   | ٧        |
| 27*  | Lights, signals and switches    | <ul><li>Check operation.</li><li>Adjust headlight beam.</li></ul>   | V                                    | V                                      | V  | V  | <b>V</b>                                  | V        |

<sup>\*</sup> Since these items require special tools, data and technical skills, have a Yamaha dealer perform the service.

#### NOTE:

From 19000 mi (31000 km) or 36 months, repeat the maintenance intervals starting from 7000 mi (11000 km) or 12 months.

#### NOTE:

- The air filter needs more frequent service if you are riding in unusually wet or dusty areas.
- Hydraulic brake service
  - After disassembling the brake master cylinders and calipers, always change the fluid. Regularly check the brake fluid levels and fill the reservoirs as required.
  - Every two years replace the internal components of the brake master cylinders and calipers, and change the brake fluid.
  - Replace the brake hoses every four years and if cracked or damaged.

#### **ENGINE**

FAS20520

#### ADJUSTING THE VALVE CLEARANCE

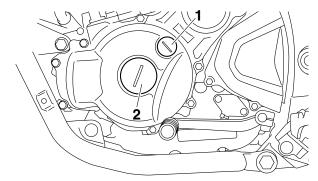
The following procedure applies to all of the valves.

#### NOTE:

- Valve clearance adjustment should be made on a cold engine, at room temperature.
- When the valve clearance is to be measured or adjusted, the piston must be at top dead center (TDC) on the compression stroke.
- 1. Remove:
- Seat
- Side cover (left/right)
- Air scoop (left/right) Refer to "GENERAL CHASSIS" on page 4-1.
- Fuel tank Refer to "FUEL TANK" on page 7-1.
- 2. Drain:
  - Coolant Refer to "CHANGING THE COOLANT" on page 3-20.
- 3. Remove:
  - Throttle cable
- Clutch cable Refer to "CAMSHAFT" on page 5-6.
- 4. Remove:
  - Ignition coil assembly
  - Spark plug Refer to "CAMSHAFT" on page 5-6.
- 5. Remove:
- Throttle bodies

Refer to "THROTTLE BODIES" on page 7-4.

- Air vent hose (Air induction)
- Cylinder head cover Refer to "CAMSHAFT" on page 5-6.
- 6. Remove:
  - Timing mark accessing screw "1"
  - Crankshaft end cover "2"



- 7. Measure:
  - Valve clearance

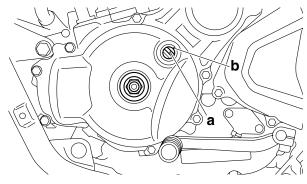
Out of specification  $\rightarrow$  Adjust.



Valve clearance (cold) Intake

0.13-0.20 mm (0.0051-0.0079 in) **Exhaust** 0.23-0.30 mm (0.0091-0.0118 in)

- a. Turn the crankshaft counterclockwise.
- b. Align TDC mark "a" of the generator rotor with mark "b" of the generator rotor cover.

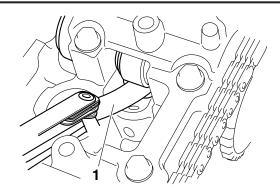


c. Measure the valve clearance with a thickness gauge "1".

Out of specification  $\rightarrow$  Adjust.



Special thickness gauge 90890-03180 Feeler gauge set YU-26900-9



8. Adjust:

Valve clearance

a. Remove:

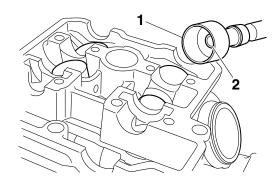
Cam chain tensioner

\*\*\*\*\*\*\*

- Camshaft cap
- Intake camshaft
- Exhaust camshaft

• Refer to "CAMSHAFT" on page 5-6.

- Before removing the cam chain and camshaft, connect the cam chain using a wire so that it does not drop in the crankcase.
- b. Remove the valve lifter "1" and the valve pad "2" with a hand valve lapper.

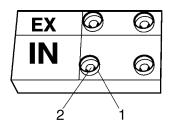




Valve lapper 90890-04101 Valve lapping tool YM-A8998

#### NOTE:

- Cover the timing chain opening with a rag to prevent the valve pad from falling into the crankcase.
- Make a note of the position of each valve lifter "1" and valve pad "2" so that they can be installed in the correct place.



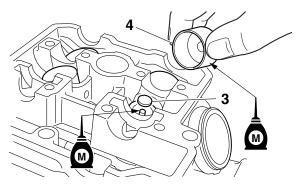
I1172202

c. Select the proper valve pad from the following table.

| Valve pad range      | Nos. 120–240  |
|----------------------|---|
| Valve pad thickness  | 120–240 mm<br>(4.72–9.45 in)                            |
| Available valve pads | 25 thicknesses in 0.05<br>mm (0.002 in) incre-<br>ments |

#### NOTE:

- The thickness of each valve pad is marked in hundredths of millimeters on the side that touches the valve lifter.
- Since valve pads of various sizes are originally installed, the valve pad number must be rounded in order to reach the closest equivalent to the original.
- Remember that the replacement valve pad number is a rough value. Repeat the above procedure until you have the standard valve clearance.
- d. Install the new valve pad "3" and the valve lifter "4".



#### NOTE

- When installing the valve pad, direct the pad having a number on it toward the lifter.
- Lubricate the valve pad with molybdenum disulfide grease.
- Lubricate the valve lifter with molybdenum disulfide oil.
- The valve lifter must turn smoothly when rotated by hand.
- Install the valve lifter and the valve pad in the correct place.
- e. Install the exhaust and intake camshafts, timing chain and the camshaft caps.



Camshaft cap bolt 10 Nm (1.0 m•kg, 7.2 ft•lb)

#### NOTE: \_

- Refer to "CAMSHAFT" on page 5-6.
- Lubricate the camshaft bearings, camshaft lobes and camshaft journals.
- First, install the exhaust camshaft.
- Align the camshaft sprocket marks with the edge of the cylinder head.
- Turn the crankshaft counterclockwise several full turns to seat the parts.
- f. Measure the valve clearance again.
- g. If the valve clearance is still out of specification, repeat all of the valve clearance adjustment steps until the specified clearance is obtained.

#### 

- 9. Install:
  - All removed parts

NOTE: \_

For installation, reverse the removal procedure. Note the following points.

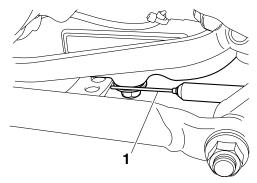
10.Fill the coolant as specification, and then check the coolant level.

EAS20590

## ADJUSTING THE ENGINE IDLING SPEED

Prior to adjusting the idling speed, the air filter element should be clean, and the engine should have adequate compression.

- 1. Start the engine and let it warm up until it reaches the specified temperature.
- 2. Use a temperature probe tester "1" and contact it to the drain bolt thread.





Oil temperature 60.0 °C (140.00 °F)

- 3. Install:
  - Digital tachometer (Red/black ignition coil leads)



Digital tachometer 90890-06760 YU-39951-B

- 4. Measure:
  - Engine idling speed
     Out of specification → Adjust.

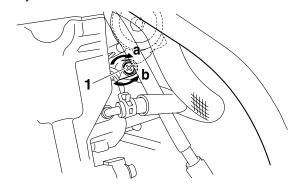


Engine idling speed 1450–1650 r/min

- 5. Adjust:
- Engine idling speed

a. Adjust the engine idling speed by turning the adjust screw "1" in direction "a" or "b".

\*



| Direction "a" | Engine idling speed $\rightarrow$ Decrease |
|---------------|--|
| Direction "b" | Engine idling speed $\rightarrow$ Increase |

#### 6. Adjust:

 Throttle cable free play Refer to "ADJUSTING THE THROTTLE CA-BLE FREE PLAY" on page 3-8.



Throttle cable free play 3.0–5.0 mm

 Throttle cable free play (Cable free play at surface of throttle grip flange)
 3–5 mm

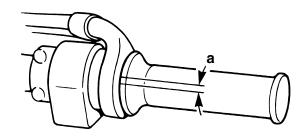
EAS2064

## ADJUSTING THE THROTTLE CABLE FREE PLAY

NOTE:

Prior to adjusting the throttle cable free play, the engine idling speed should be adjusted properly.

- 1. Check:
- Throttle cable free play "a" Out of specification  $\rightarrow$  Adjust.





## Throttle cable free play 3.0-5.0 mm (0.12-0.20 in)

- 2. Remove:
  - Seat
  - Side cover (left/right)
  - Air scoop (left/right) Refer to "GENERAL CHASSIS" on page 4-1.
  - Fuel tank Refer to "FUEL TANK" on page 7-1.
- 3. Adjust:
  - Throttle cable free play

When the throttle is opened, the accelerator cable is pulled.

## Throttle body side

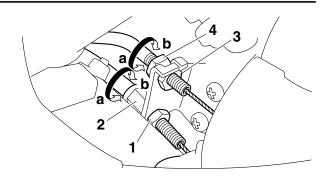
- a. Loosen the locknut "1" on the decelerator cable.
- b. Turn the adjusting nut "2" in direction "a" or "b" to take up any slack on the decelerator ca-
- c. Loosen the locknut "3" on the accelerator ca-
- d. Turn the adjusting nut "4" in direction "a" or "b" until the specified throttle cable free play is obtained.

Direction "a"

Throttle cable free play is increased. Direction "b"

Throttle cable free play is decreased.

e. Tighten the locknuts "1", "3".



NOTE:

If the specified throttle cable free play cannot be obtained on the throttle body side of the cable. use the adjusting nut on the handlebar side.

#### Handlebar side

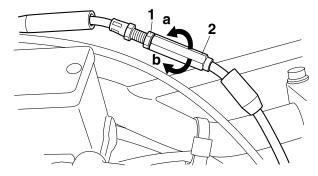
- a. Loosen the locknut "1".
- b. Turn the adjusting nut "2" in direction "a" or "b" until the specified throttle cable free play is obtained.

Direction "a"

Throttle cable free play is increased. Direction "b"

Throttle cable free play is decreased.

c. Tighten the locknut.



## **WARNING**

After adjusting the throttle cable free play, start the engine and turn the handlebars to the right and to the left to ensure that this does not cause the engine idling speed to change.

## 4. Install:

 Fuel tank Refer to "GENERAL CHASSIS" on page 4-1.

- Air scoop (left/right)
- Side cover (left/right)

 Seat Refer to "GENERAL CHASSIS" on page 4-1.

EAS20690

#### CHECKING THE SPARK PLUG

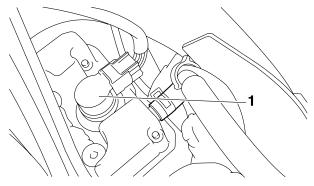
- 1. Remove:
  - Seat
  - Side cover (left/right)
- Air scoop (left/right)

Refer to "GENERAL CHASSIS" on page 4-1.

• Fuel tank

Refer to "GENERAL CHASSIS" on page 4-1.

- 2. Remove:
  - Ignition coil assembly "1"
  - Spark plug Refer to "CAMSHAFT" on page 5-6.



ECA13330

#### **CAUTION:**

Before removing the spark plug, blow away any dirt accumulated in the spark plug well with compressed air to prevent it from falling into the cylinder.

- 3. Check:
  - Spark plug type Incorrect → Change.



## Manufacturer/model NGK/CR9EK

- 4. Check:
- Electrode

Damage/wear → Replace the spark plug.

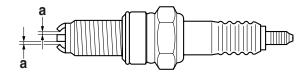
Insulator

Abnormal color  $\rightarrow$  Replace the spark plug. Normal color is medium-to-light tan.

- 5. Clean:
  - Spark plug (with a spark plug cleaner or wire brush)
- 6. Measure:
  - Spark plug gap "a"
     Out of specification → Regap.



Spark plug gap 0.6-0.7 mm (0.024-0.028 in)



#### 7. Install:

Spark plug



Spark plug 13 Nm (1.3 m•kg, 9.4 ft•lb)

#### NOTE:

Before installing the spark plug, clean the spark plug and gasket surface.

- 8. Connect:
- Ignition coil assembly
- Ignition coil assembly lead

#### NOTE:

Apply silicone hydrate to the sealing point of the ignition coil, and install the ignition coil assembly by positioning its connector to the right.

- 9. Install:
- Fuel tank

Refer to "GENERAL CHASSIS" on page 4-1.

- Air scoop (left/right)
- Side cover (left/right)
   Peter to "CENERAL"

Refer to "GENERAL CHASSIS" on page 4-1.

EAS2070

#### **CHECKING THE IGNITION TIMING**

NOTE:\_

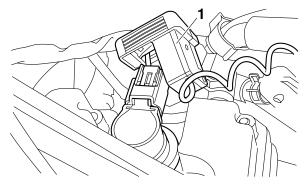
Prior to checking the ignition timing, check the wiring connections of the entire ignition system. Make sure all connections are tight and free of corrosion.

- 1. Remove:
- Timing mark accessing screw
- Seat
- Side cover (left/right)
- Air scoop (left/right)
  Refer to "GENERAL CHASSIS" on page 4-1.
- 2. Connect:
- Timing light "1"
- Digital tachometer

#### (Red/black ignition coil leads)



Timing light 90890-03141 Inductive clamp timing light YU-03141 Digital tachometer 90890-06760 YU-39951-B



- 3. Check:
  - Ignition timing
- a. Start the engine, warm it up for several minutes, and then let it run at the specified engine idling speed.

\*

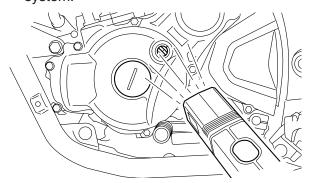


Oil temperature 55–65°C



Engine idling speed 1450–1650 r/min

b. Check the firing range as shown. Incorrect firing range  $\rightarrow$  Check the ignition system.



NOTE:

The ignition timing is not adjustable.

Digital tachometer

- 5. Install:
  - Air scoop (left/right)
- Side cover (left/right)
- Seat

Refer to "GENERAL CHASSIS" on page 4-1.

Timing mark accessing screw

EAS20710

## MEASURING THE COMPRESSION PRESSURE

The following procedure applies to all of the cylinders.

#### NOTE:

Insufficient compression pressure will result in a loss of performance.

- 1. Measure:
  - Valve clearance
     Out of specification → Adjust.
     Refer to "ADJUSTING THE VALVE CLEAR-ANCE" on page 3-5.
- 2. Start the engine, warm it up for several minutes, and then turn it off.
- 3. Remove:
- Seat
- Side cover (left/right)
- Air scoop (left/right)
   Refer to "GENERAL CHASSIS" on page 4-1.
- Fuel tank
   Refer to "FUEL TANK" on page 7-1.
- 4. Disconnect:
  - Ignition coil assembly coupler
- 5. Remove:
- Ignition coil assembly
- Spark plug

ECA13340

#### **CAUTION:**

Before removing the spark plugs, use compressed air to blow away any dirt accumulated in the spark plug wells to prevent it from falling into the cylinders.

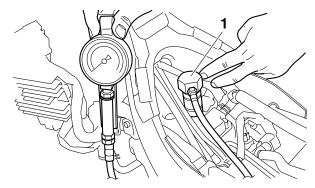
- 6. Install:
- Compression gauge "1"



Compression gauge 90890-03081 Engine compression tester YU-33223

#### 

- 4. Remove:
- Timing light



#### 7. Measure:

 $\bullet$  Compression pressure Out of specification  $\to$  Refer to steps (c) and (d).



Compression pressure (Standard)

850 kPa (121 psi) (8.5 kg/cm<sup>2</sup>) Compression pressure (Minimum)

740 kPa (105 psi) (7.4 kg/cm<sup>2</sup>) Compression pressure (Maximum)

950 kPa (135 psi) (9.5 kg/cm<sup>2</sup>)

- a. Set the main switch to "ON".
- b. With the throttle wide open, crank the engine until the reading on the compression gauge stabilizes.

#### NOTE:

- Make use the battery is fully charged when taking measurements.
- Make sure there is no compression leakage from the connecting section of the compression gauge.
- c. If the compression pressure is above the maximum specification, check the cylinder head, valve surfaces and piston crown for carbon deposits.

Carbon deposits  $\rightarrow$  Eliminate.

d. If the compression pressure is below the minimum specification, pour a teaspoonful of engine oil into the spark plug bore and measure again.

Refer to the following table.

| Compression pressure (with oil applied into the cylinder) |  |  |  |  |
|---|--|--|--|--|
| Reading   | Diagnosis  |  |  |  |
| Higher than without oil                                   | Piston ring (s) wear or damage $\rightarrow$ Repair. |  |  |  |

Same as without oil

Piston, valves, cylinder head gasket or piston possibly defective → Repair.

## 

#### 8. Install:

Spark plug



Spark plug 13 Nm (1.3 m•kg, 9.4 ft•lb)

- 9. Install:
- Ignition coil assembly

#### 10.Connect:

- Ignition coil assembly lead coupler
- 11.Install:
- Fuel tank
  Refer to "FUEL TANK" on page 7-1.
- Air scoop (left/right)
- Side cover (left/right)
- Seat

Refer to "GENERAL CHASSIS" on page 4-1.

EAS20730

#### **CHECKING THE ENGINE OIL LEVEL**

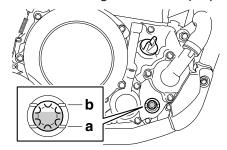
1. Stand the vehicle on a level surface.

#### NOTE:

- Place the vehicle on a suitable stand.
- Make sure the vehicle is upright.
- 2. Start the engine, warm it up for several minutes, and then turn it off.
- 3. Check:
  - Engine oil level

The engine oil level should be between the minimum level mark "a" and maximum level mark "b".

Below the minimum level mark  $\rightarrow$  Add the recommended engine oil to the proper level.





Type

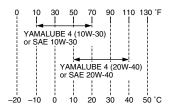
YAMALUBE 4, SAE 10W-30 or SAE 20W-40

Recommended engine oil grade API service SG type or higher, JASO standard MA

ECA13360

#### **CAUTION:**

- Engine oil also lubricates the clutch and the wrong oil types or additives could cause clutch slippage. Therefore, do not add any chemical additives or use engine oils with a grade of CD or higher and do not use oils labeled "ENERGY CONSERVING II".
- Do not allow foreign materials to enter the crankcase.





NOTE:

Before checking the engine oil level, wait a few minutes until the oil has settled.

- 4. Start the engine, warm it up for several minutes, and then turn it off.
- 5. Check the engine oil level again.

**NOTE** 

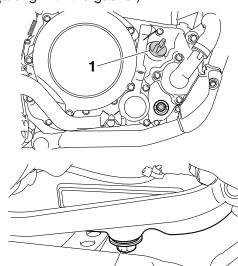
Before checking the engine oil level, wait a few minutes until the oil has settled.

EAS20810

#### **CHANGING THE ENGINE OIL**

- 1. Start the engine, warm it up for several minutes, and then turn it off.
- 2. Place a container under the engine oil drain bolt.

- 3. Remove:
  - Engine oil filler cap "1"
- Engine oil drain bolt "2" (along with the gasket)

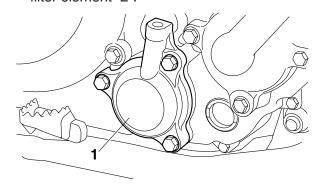


- 4. Drain:
- Engine oil (completely from the crankcase)

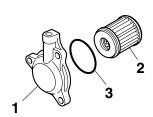
2

5. If the oil filter element is also to be replaced, perform the following procedure.

a. Remove the oil filter element cover "1" and oil filter element "2".



b. Replace the O-rings "3".



c. Install the new oil filter element and the oil fil-

ter element cover.



Oil filter element cover bolt (M10) 10 Nm (1.0 m•kg, 7.2 ft•lb)

- 6. Check:
- Engine oil drain bolt gasket
- Oil filter element drain bolt gasket Damage  $\rightarrow$  Replace.
- 7. Install:
  - Engine oil drain bolt (along with the gasket)



Engine oil drain bolt 20 Nm (2.0 m•kg, 14 ft•lb)

#### 8. Fill:

 Crankcase (with the specified amount of the recommended engine oil)



**Engine oil quantity** Total amount

1.50 L (1.59 US qt) (1.32 Imp.qt) Without oil filter element replace-

1.30 L (1.37 US qt) (1.14 Imp.qt) With oil filter element replace-

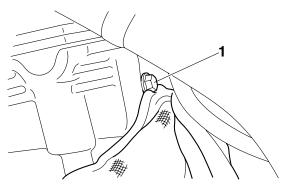
1.40 L (1.48 US qt) (1.23 lmp.qt)

- 9. Install:
  - Engine oil filler cap
- 10.Start the engine, warm it up for several minutes, and then turn it off.
- 11.Check:
- Engine (for engine oil leaks)
- 12.Check:
- Engine oil level Refer to "CHECKING THE ENGINE OIL LEVEL" on page 3-12.

\*

- 13.Check:
- Engine oil pressure

a. Slightly loosen the oil check bolt "1".



- b. Start the engine and keep it idling until engine oil starts to seep from the oil check bolt. If no engine oil comes out after one minute, turn the engine off so that it will not seize.
- c. Check the engine oil passages, the oil filter cartridge and the oil pump for damage or leakage. Refer to "OIL PUMP AND BALANC-ER GEAR" on page 5-45.
- d. Start the engine after solving the problem (s) and check the engine oil pressure again.
- e. Tighten the oil check bolt to specification.



Oil check bolt 10 Nm (1.0 m•kg, 7.2 ft•lb)

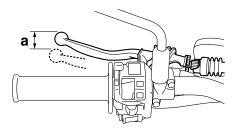
\_\_\_\_\_

## ADJUSTING THE CLUTCH CABLE FREE **PLAY**

- 1. Check:
- Clutch cable free play "a" Out of specification  $\rightarrow$  Adjust.



Clutch lever free play 10.0–15.0 mm (0.39–0.59 in)



- 2. Adjust:
- Clutch cable free play

\*\*\*\*\*\*\*\*\*\*\*

#### Handlebar side

- Loosen the locknut "1".
- b. Turn the adjusting bolt "2" in direction "a" or "b" until the specified clutch cable free play is

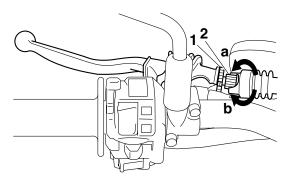
obtained.

Direction "a"

Clutch cable free play is increased. Direction "b"

Clutch cable free play is decreased.

c. Tighten the locknut "1".



NOTE:

If the specified clutch cable free play cannot be obtained on the handlebar side of the cable, use the adjusting nut on the clutch cable side.

#### Clutch cable side

- a. Slide the clutch cable cover.
- b. Loosen the locknuts "1".
- c. Turn the adjusting bolt "2" in direction "a" or "b" until the specified clutch cable free play is obtained.

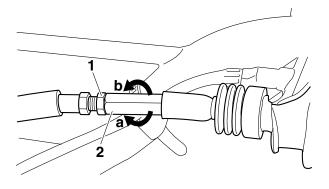
Direction "a"

Clutch cable free play is increased.

Direction "b"

Clutch cable free play is decreased.

- d. Tighten the locknut "1".
- e. Return the clutch cable cover to its original position.



EAS20941

### **CLEANING THE AIR FILTER ELEMENT**

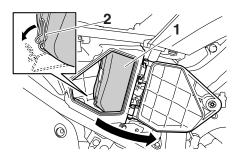
- 1. Remove:
- Air filter check hose

#### NOTE:

On the bottom of the air filter case is a check hose. If dust or water or both collects in this hose, replace the air filter element, clean the air filter case and air filter check hose.

- 2. Remove:
  - Right side cover
     Refer to "GENERAL CHASSIS" on page 4-1.
- 3. Open the air filter case cover by removing its screws.
- 4. Remove the air filter element assembly "1" by removing the clip "2".
- 5. Remove:
- Air filter element

Remove the air filter element from the air filter element frame.



- 6. Clean:
  - Air filter element (with solvent)

WARNING

Never use low flash point solvents, such as gasoline, to clean the air filter element. Such solvents may cause a fire or an explosion.

#### NOTE:

After cleaning, gently squeeze the air filter element to remove the excess solvent.

ECA13430

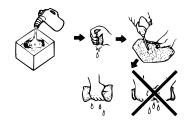
### **CAUTION:**

Do not twist the air filter element when squeezing it.

- 7. Check:
  - Air filter element
     Damage → Replace.
- 8. Apply the recommended oil to the entire surface of the air filter element and squeeze out the excess oil. The air filter element should be wet but not dripping.



## Recommended oil Foam air filter oil or engine oil



#### 9. Install:

• Air filter element frame

ECA14401

#### **CAUTION:**

Never operate the engine without the air filter element installed. Unfiltered air will cause rapid wear of engine parts and may damage the engine. Operating the engine without the air filter element will also affect carburetor synchronization, leading to poor engine performance and possible overheating.

#### 10.Install:

• Air filter element assembly

#### 11.Install:

Air filter cover

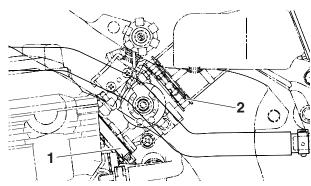
#### 12.Install:

Side cover (right)
 Refer to "GENERAL CHASSIS" on page 4-1.

EAS21020

#### CHECKING THE THROTTLE BODY JOINT

- 1. Remove:
- Seat
- Side cover (left/right)
- Air scoop (left/right)
   Refer to "GENERAL CHASSIS" on page 4-1.
- Fuel tank
   Refer to "FUEL TANK" on page 7-1.
- 2. Check:
  - Throttle body joint "1"
     Cracks/damage → Replace.
  - Insulator manifold "2"
     Cracks/damage → Replace.



- 3. Install:
  - Fuel tank
     Refer to "FUEL TANK" on page 7-1.
  - Air scoop (left/right)
  - Side cover (left/right)
- Seat Refer to "GENERAL CHASSIS" on page 4-1.

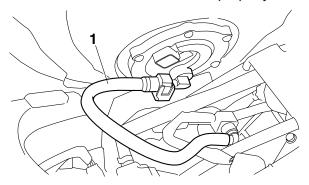
EAS21030

#### CHECKING THE FUEL LINE

The following procedure applies to all of the fuel, vacuum and breather hoses.

- 1. Remove:
  - Seat
- Side cover (left/right)
- Air scoop (left/right)
   Refer to "GENERAL CHASSIS" on page 4-1.
- Fuel tank
   Refer to "FUEL TANK" on page 7-1.
- 2. Check:
  - Fuel hose "1"
     Cracks/damage → Replace.

     Loose connection → Connect properly.



- 3. Fuel tank
- Fuel tank

Refer to "GENERAL CHASSIS" on page 4-1.

- Air scoop (left/right)
- Side cover (left/right)
- Seat

Refer to "GENERAL CHASSIS" on page 4-1.

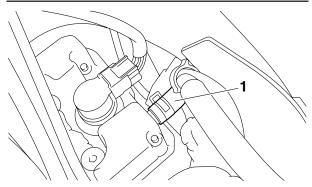
## CHECKING THE CYLINDER HEAD BREATHER HOSE

- 1. Remove:
- Seat
- Side cover (left/right)
- Air scoop (left/right)
   Refer to "GENERAL CHASSIS" on page 4-1.
- Fuel tank
   Refer to "FUEL TANK" on page 7-1.
- 2. Check:
  - Cylinder head breather hose "1"
     Cracks/damage → Replace.
     Loose connection → Connect properly.

ECA14920

#### **CAUTION:**

# Make sure the cylinder head breather hose is routed correctly.



- 3. Install:
- Fuel tank
   Refer to "FUEL TANK" on page 7-1.
- Air scoop (left/right)
- Side cover (left/right)
- Seat

Refer to "GENERAL CHASSIS" on page 4-1.

EAS21080

## **CHECKING THE EXHAUST SYSTEM**

The following procedure applies to all of the exhaust pipes and gaskets.

- 1. Remove:
- Muffler protector
- 2. Check:
  - Exhaust pipe
  - Muffler

Cracks/damage  $\rightarrow$  Replace.

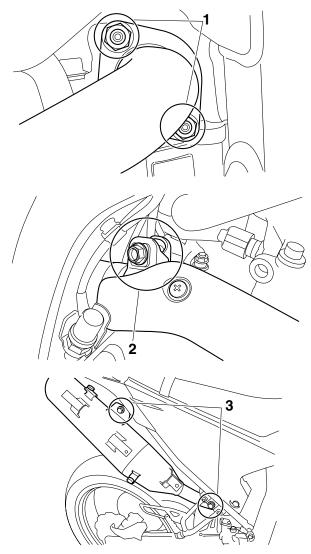
• Gasket

- Exhaust gas leaks  $\rightarrow$  Replace. 3. Check:
  - Tightening torque



Exhaust pipe nut "1"
20 Nm (2.0 m•kg, 14 ft•lb)
Exhaust pipe and muffler bolt "2"
20 Nm (2.0 m•kg, 14 ft•lb)
Muffler and muffler bracket bolt
"3"

42 Nm (4.2 m•kg, 30 ft•lb)



- 4. Install:
- Muffler protector

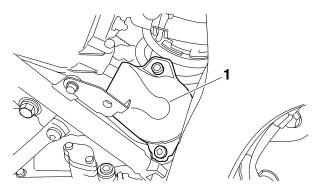


Muffler protector bolt 7 Nm (0.7 m•kg, 5.1 ft•lb)

EAS2110

#### **ADJUSTING THE EXUP CABLES**

- 1. Remove:
- Side cover (left/right)
  Refer to "GENERAL CHASSIS" on page 4-1.
- 2. Remove:
- EXUP valve pulley cover "1"



- 3. Check:
  - EXUP system operation

NOTE:

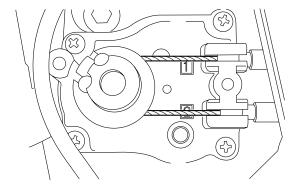
Check operation by self-diagnostics diagnosis mode No. "53".

Refer to "FUEL INJECTION SYSTEM" on page 8-29.

- 4. Check:
  - EXUP cable free play (at the EXUP valve pulley)
  - Connect the battery power cables to the servo motor, and measure its play.



## EXUP cable free play 0 mm



- 5. Adjust:
  - EXUP cable free play

NOTE:

Install pulley cable 1 (black chrome plated) to stamp 1 side, and install pulley cable 2 (white chrome plated) to stamp 2 side.

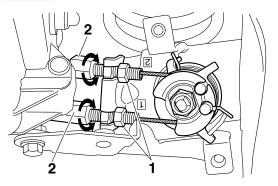
- a. Move EXUP pully by self-diagnostics diagno-
- sis mode No. "53". b. Loosen both locknuts "1".
- Turn the adjusting bolt "2" of pulley cable 1 to the position just when the EXUP pulley starts operating.
- d. Turn the adjusting bolt "2" of pulley cable 2 to the position when the cable has the same

tension as for pulley cable 1.

e. Tighten both locknuts "1" with specification.



## Locknut 6 Nm (0.6 m•kg, 4.3 ft•lb)



f. Install the EXUP valve pully cover.

6. Install:

Side cover (left/right)
 Refer to "GENERAL CHASSIS" on page 4-1.

EAS28970

### **CLEANING THE SPARK ARRESTER**

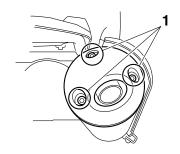
- 1. Clean:
  - Spark arrester

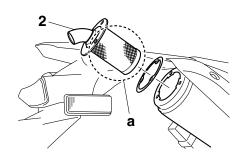
\*\*\*\*\*\*

EWA14680

#### **WARNING**

- Select a well-ventilated area free of combustible materials.
- Always let the exhaust system cool before performing this operation.
- Do not start the engine when removing the tailpipe from the muffler.
- a. Remove the bolt "1".
- b. Remove the tailpipe "2" by pulling it out of the muffler.
- c. Tap the tailpipe lightly with a soft-face hammer or suitable tool, then use a wire brush to remove any carbon deposits from the spark arrester portion "a" of the tailpipe and the inner contact surfaces of the muffler.





- d. Insert the tailpipe into the muffler and align the bolt holes.
- e. Insert the bolt and tighten it.



Spark arrester bolt 12 Nm (1.2 m•kg, 8.7 ft•lb) (Apply the molybdenum-disulfide grease)

EAS21090

# CHECKING THE CANISTER (FOR CALIFORNIA ONLY)

\_\_\_\_

- 1. Remove:
- Canister cover Refer to "CANISTER (FOR CALIFORNIA)" on page 7-13.
- 2. Check:
  - Canister
  - Hose
     Cracks/c

Cracks/damage  $\rightarrow$  Replace.

- 3. Install:
- Canister cover



Canister cover bolt 10 Nm (1.0 m•kg, 7.2 ft•lb)

EAS21110

### **CHECKING THE COOLANT LEVEL**

1. Stand the vehicle on a level surface.

NOTE:

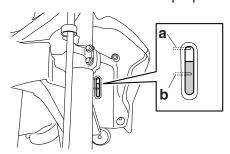
Place the vehicle on a suitable stand.

Make sure the vehicle is upright.

- 2. Remove:
- Seat
- Air scoop
   Refer to "GENERAL CHASSIS" on page 4-1.
- 3. Check:
  - Coolant level

The coolant level should be between the maximum level mark "a" and minimum level mark "b".

Below the minimum level mark  $\rightarrow$  Add the recommended coolant to the proper level.



ECA13470

### **CAUTION:**

- Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant check, and if necessary, correct the antifreeze concentration of the coolant.
- Use only distilled water. However, if distilled water is not available, soft water may be used.
- 4. Start the engine, warm it up for several minutes, and then turn it off.
- Check:
  - Coolant level

NOTE:

Before checking the coolant level, wait a few minutes until it settles.

- 6. Install:
- Air scoop (left)
- Seat

Refer to "GENERAL CHASSIS" on page 4-1.

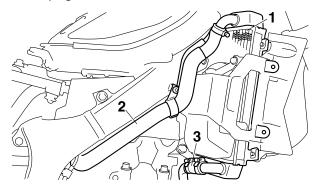
EAS21120

#### **CHECKING THE COOLING SYSTEM**

- 1. Remove:
  - Seat
  - Air scoop (left/right)
     Refer to "GENERAL CHASSIS" on page 4-1.
  - Fuel tank
    Refer to "FUEL TANK" on page 7-1.
- 2. Check:
- Radiator "1"

- Radiator inlet hose "2"
- Radiator outlet hose "3"
   Cracks/damage → Replace.

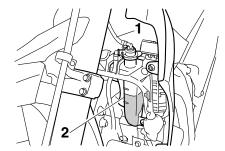
   Refer to "RADIATOR" on page 6-1, "THER-MOSTAT" on page 6-4 and "WATER PUMP" on page 6-6.



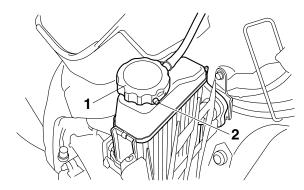
- 3. Install:
  - Fuel tank
     Refer to "FUEL TANK" on page 7-1.
  - Fuel tank (left/right)
  - Seat Refer to "GENERAL CHASSIS" on page 4-1.

#### CHANGING THE COOLANT

- 1. Remove:
- Seat
- Air scoop (left/right)
  Refer to "GENERAL CHASSIS" on page 4-1.
- 2. Remove:
  - Coolant reservoir hose "1"
  - Recovery tank "2"



- 3. Drain:
- Coolant (from the recovery)
- 4. Remove:
  - Radiator cap "1"
     Remove the radiator cap by removing lock screw "2".

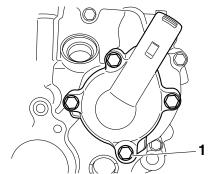


WARNING

A hot radiator is under pressure. Therefore, do not remove the radiator cap when the engine is hot. Scalding hot fluid and steam may be blown out, which could cause serious injury. When the engine has cooled, open the radiator cap as follows:

Place a thick rag or a towel over the radiator cap and slowly turn the radiator cap counterclockwise toward the detent to allow any residual pressure to escape. When the hissing sound has stopped, press down on the radiator cap and turn it counterclockwise to remove.

- 5. Remove:
- Coolant drain bolt (water pump) "1" (along with the copper washer)



- 6. Drain:
  - Coolant (from the engine and radiator)
- 7. Install:
  - Copper washer New
  - Coolant drain bolt (water pump)



Coolant drain bolt (engine) 10 Nm (1.0 m•kg, 7.2 ft•lb)

- 8. Install:
- Reservoir tank
- 9. Connect:
- Coolant reservoir hose

#### 10.Fill:

 Cooling system (with the specified amount of the recommended coolant)



Recommended antifreeze

High-quality ethylene glycol antifreeze containing corrosion inhibitors for aluminum engines Mixing ratio

1:1 (antifreeze:water)

Radiator capacity (including all routes)

0.90 L (0.95 US qt) (0.79 Imp.qt)
Coolant reservoir capacity (up to the maximum level mark)
0.25 L (0.26 US qt) (0.22 Imp.qt)



Handling notes for coolant Coolant is potentially harmful and should be handled with special care.

## • WARNING

- If coolant splashes in your eyes, thoroughly wash them with water and consult a doctor
- If coolant splashes on your clothes, quickly wash it away with water and then with soap and water.
- If coolant is swallowed, induce vomiting and get immediate medical attention.

CA13480

#### **CAUTION:**

- Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant check, and if necessary, correct the antifreeze concentration of the coolant.
- Use only distilled water. However, if distilled water is not available, soft water may be used.
- If coolant comes into contact with painted surfaces, immediately wash them with wa-

#### ter.

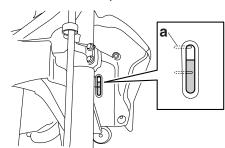
## • Do not mix different types of antifreeze.

#### 11.Install:

Radiator cap

#### 12.Fill:

 Coolant reservoir (with the recommended coolant to the maximum level mark "a")



### 13.Install:

- Coolant reservoir cap
- 14. Start the engine, warm it up for several minutes, and then stop it.

#### 15.Check:

 Coolant level Refer to "CHECKING THE COOLANT LEV-EL" on page 3-19.

#### NOTE: \_

Before checking the coolant level, wait a few minutes until the coolant has settled.

#### 16.Install:

- Air scoop (left/right)
- Seat

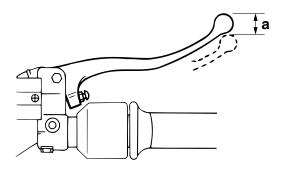
Refer to "GENERAL CHASSIS" on page 4-1.

### **CHASSIS**

EAS21170

#### ADJUSTING THE FRONT DISC BRAKE

- 1. Check:
- Brake lever free play "a"
   Out of specification → Adjust.





Front brake lever free play 5.0–8.0 mm (0.20–0.31 in)

- 2. Adjust:
  - Brake lever free play
- a. Loosen the locknut "1".

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

b. Turn the adjusting bolt "2" in direction "a" or "b" until the specified brake lever free play is obtained.

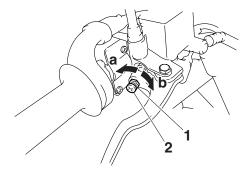
Direction "a"

Brake lever free play is increased.

Direction "b"

Brake lever free play is decreased.

c. Tighten the locknut "1".



WARNING

A soft or spongy feeling in the brake lever can indicate the presence of air in the brake system. Before the vehicle is operated, the air must be removed by bleeding the brake system. Air in the brake system will considerably reduce braking performance.

ECA13490

#### **CAUTION:**

After adjusting the brake lever position, make sure there is no brake drag.

\*\*\*\*\*\*

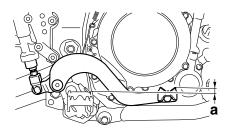
EAS21200

#### ADJUSTING THE REAR DISC BRAKE

- 1. Check:
  - Brake pedal position "a"
     (distance "a" from the top of the rider footrest to the top of the brake pedal)
     Out of specification → Adjust.



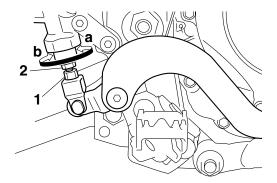
Brake pedal position 11.5 mm (0.45 in)



- 2. Adjust:
  - Brake pedal position
- a. Loosen the locknut "1".
- b. Turn the adjusting bolt "2" in direction "a" or "b" until the specified brake pedal position is obtained.

\*\*\*\*\*\*\*\*\*\*\*

Direction "a"
Brake pedal is raised.
Direction "b"
Brake pedal is lowered.



c. Tighten the locknut "1" to specification.



Locknut 12 Nm (1.2 m•kg, 8.7 ft•lb)



## **⚠** WARNING

A soft or spongy feeling in the brake lever can indicate the presence of air in the brake system. Before the vehicle is operated, the air must be removed by bleeding the brake system. Air in the brake system will considerably reduce braking performance.

ECA13510

#### **CAUTION:**

After adjusting the brake pedal position, make sure there is no brake drag.

#### 

- 3. Adjust:
  - Rear brake light switch Refer to "ADJUSTING THE REAR BRAKE LIGHT SWITCH" on page 3-24.

FAS21240

#### **CHECKING THE BRAKE FLUID LEVEL**

1. Stand the vehicle on a level surface.

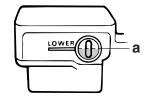
### NOTE:

- Place the vehicle on a suitable stand.
- Make sure the vehicle is upright.
- In order to ensure a correct reading of the brake fluid level, make sure the top of the brake fluid reservoir is horizontal.
- 2. Check:
  - Brake fluid level
     Below the minimum level mark "a" → Add the recommended brake fluid to the proper level.

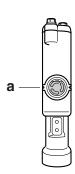


Recommended fluid DOT 4

Α







- A. Front brake
- B. Rear brake

EWA13090

## **WARNING**

- Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.
- Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.
- When refilling, be careful that water does not enter the brake fluid reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.

ECA13540

#### **CAUTION:**

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

EAS21250

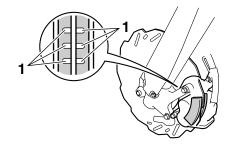
#### CHECKING THE FRONT BRAKE PADS

The following procedure applies to all of the brake pads.

- 1. Operate the brake.
- 2. Check:
- Front brake pad

Wear indicator groove "1" almost disappeard  $\rightarrow$  Replace the brake pads as a set.

Refer to "FRONT BRAKE" on page 4-11.



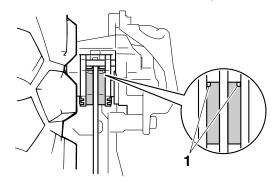
FAS21260

#### CHECKING THE REAR BRAKE PADS

The following procedure applies to all of the brake pads.

- 1. Operate the brake.
- 2. Check:
- Rear brake pad

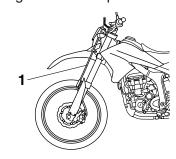
Wear indicators "1" almost touch the brake disc  $\rightarrow$  Replace the brake pads as a set. Refer to "REAR BRAKE" on page 4-23.



EAS21270

### **CHECKING THE FRONT BRAKE HOSE**

- 1. Check:
- Brake hose "1"
   Cracks/damage/wear → Replace.



- 2. Check:
- Brake hose clamp
   Loose Connection → Tighten the clamp bolt.
- 3. Hold the vehicle upright and apply the front brake several times.
- 4. Check:
  - Brake hose "1"

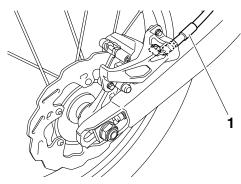
Brake fluid leakage  $\rightarrow$  Replace the damaged hose.

Refer to "FRONT BRAKE" on page 4-11.

EAS21290

#### CHECKING THE REAR BRAKE HOSE

- 1. Check:
- Brake hose "1"
   Cracks/damage/wear → Replace.



- 2. Check:
  - Brake hose clamp
     Loose Connection → Tighten the clamp bolt.
- Hold the vehicle upright and apply the rear brake several times.
- 4. Check:
  - Brake hose

Brake fluid leakage  $\rightarrow$  Replace the damaged hose.

Refer to "REAR BRAKE" on page 4-23.

EAS213

## ADJUSTING THE REAR BRAKE LIGHT SWITCH

NOTE: \_

The rear brake light switch is operated by movement of the brake pedal. The rear brake light switch is properly adjusted when the brake light comes on just before the braking effect starts.

- 1. Check:
- Rear brake light operation timing Incorrect → Adjust.
- 2. Adjust:
  - Rear brake light operation timing

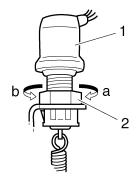
a. Hold the main body "1" of the rear brake light switch so that it does not turn the adjusting nut "2" in direction "a" or "b" until the rear brake light comes on at the proper time.

Direction "a"

Brake light comes on sooner.

Direction "b"

Brake light comes on later.



## BLEEDING THE HYDRAULIC BRAKE SYSTEM

EWA13100

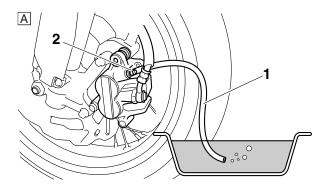
## **WARNING**

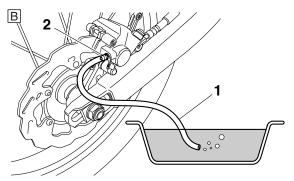
Bleed the hydraulic brake system whenever:

- the system is disassembled.
- a brake hose is loosened, disconnected or replaced.
- the brake fluid level is very low.
- brake operation is faulty.
- 1. Remove:
  - Brake master cylinder reservoir cap

#### NOTE

- Be careful not to spill any brake fluid or allow the brake master cylinder reservoir or brake fluid reservoir to overflow.
- When bleeding the hydraulic brake system, make sure there is always enough brake fluid before applying the brake. Ignoring this precaution could allow air to enter the hydraulic brake system, considerably lengthening the bleeding procedure.
- If bleeding is difficult, it may be necessary to let the brake fluid settle for a few hours. Repeat the bleeding procedure when the tiny bubbles in the hose have disappeared.
- 2. Bleed:
- Hydraulic brake system
- a. Fill the brake fluid reservoir to the proper level with the recommended brake fluid.
- Install the diaphragm (brake master cylinder reservoir or brake fluid reservoir).
- c. Connect a clear plastic hose "1" tightly to the bleed screw "2", and place an oil pan under the vinyl hose end on one side.





- A. Front
- B. Rear
- d. Place the other end of the hose into a container.
- e. Slowly apply the brake several times.
- f. Fully pull the brake lever or fully press down the brake pedal and hold it in position.
- g. Loosen the bleed screw.

#### NOTE:

Loosening the bleed screw will release the pressure and cause the brake lever to contact the throttle grip or the brake pedal to fully extend.

- h. Tighten the bleed screw and then release the brake lever or brake pedal.
- i. Repeat steps (e) to (h) until all of the air bubbles have disappeared from the brake fluid in the plastic hose.
- i. Tighten the bleed screw to specification.



## Bleed screw 6 Nm (0.6 m•kg, 4.3 ft•lb)

k. Fill the brake fluid reservoir to the proper level with the recommended brake fluid. Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-23.

## WARNING

After bleeding the hydraulic brake system, check the brake operation.

## \*\*\*\*\*

EAS21420

## ADJUSTING THE DRIVE CHAIN SLACK

NOTE: \_

The drive chain slack must be checked at the tightest point on the chain.

ECA13550

#### **CAUTION:**

A drive chain that is too tight will overload the engine and other vital parts, and one that is too loose can skip and damage the swingarm or cause an accident. Therefore, keep the drive chain slack within the specified limits.

1. Stand the vehicle on a level surface.

EWA13120

### **WARNING**

Securely support the vehicle so that there is no danger of it falling over.

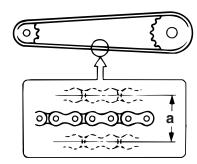
NOTE:

Place the vehicle on a suitable stand so that the rear wheel is elevated.

- 2. Spin the rear wheel several times and find the tightest position of drive chain.
- 3. Check:
- Drive chain slack "a"
   Out of specification → Adjust.

NOTE:

Measure the drive chain slack in an intermediate position between the chain tensioner and the chain support bolt.





Drive chain slack WR250R 38.0–48.0 mm WR250X 40.0–50.0 mm

- 4. Adjust:
- Drive chain slack

- a. Loosen the wheel axle nut "1".
- b. Loosen both locknuts "2".
- c. Turn the drive chain puller "3" in direction "a" or "b" until the specified drive chain slack is obtained.

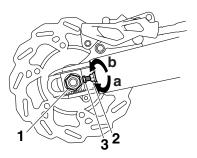
\*

Direction "a"

Drive chain is tightened.

Direction "b"

Drive chain is loosened.



#### NOTE: \_

- To maintain the proper wheel alignment, adjust both sides evenly.
- Push the rear wheel forward to make sure there is no clearance between the swingarm end plates and the ends of the swingarm.
- d. Tighten the locknut.



Locknut 16 Nm (1.6 m•kg, 12 ft•lb)

e. Tighten the wheel axle nut.



Wheel axle nut 125 Nm (12.5 m•kg, 90 ft•lb)

EAS2144

#### **LUBRICATING THE DRIVE CHAIN**

The drive chain consists of many interacting parts. If the drive chain is not maintained properly, it will wear out quickly. Therefore, the drive chain should be serviced, especially when the

vehicle is used in dusty areas.

This vehicle has a drive chain with small rubber O-rings between each side plate. Steam cleaning, high-pressure washing, certain solvents, and the use of a coarse brush can damage these O-rings. Therefore, use only kerosene to clean the drive chain. Wipe the drive chain dry and thoroughly lubricate it with engine oil or chain lubricant that is suitable for O-ring chains. Do not use any other lubricants on the drive chain since they may contain solvents that could damage the O-rings.



Recommended lubricant
Engine oil or chain lubricant
suitable for O-ring chains

EAS21510

## CHECKING AND ADJUSTING THE STEERING HEAD

1. Stand the vehicle on a level surface.

EWA13120

## **⚠** WARNING

Securely support the vehicle so that there is no danger of it falling over.

#### NOTE:

Place the vehicle on a suitable stand so that the front wheel is elevated.

- 2. Check:
  - Steering head

Grasp the bottom of the front fork legs and gently rock the front fork.

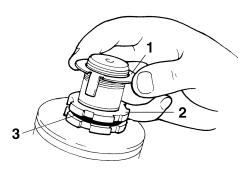
Blinding/looseness  $\rightarrow$  Adjust the steering head.

- 3. Remove:
  - Handlebar

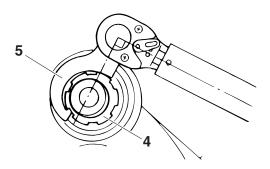
Refer to "HANDLEBAR" on page 4-34.

- Upper bracket
   Refer to "STEERING HEAD" on page 4-49.
- 4. Adjust:
  - Steering head

a. Remove the lock washer "1", the upper ring nut "2", and the rubber washer "3".



b. Tighten the lower ring nut "4" with a steering nut wrench "5".





Steering nut wrench 90890-01403 Spanner wrench YU-33975



Lower ring nut (initial tightening torque)
38 Nm (3.8 m•kg, 27 ft•lb)

- c. Turn the front fork to the right and left a few times, and make sure that the steering rotates smoothly. If it does not turn smoothly, remove the lower bracket and inspect the upper and lower bearings.
  - Refer to "STEERING HEAD" on page 4-49.
- d. Loosen the lower ring nut "4" fully turn and then tighten it to specification with a steering nut wrench.

EWA13140

## **MARNING**

Do not overtighten the lower ring nut.



Lower ring nut (final tightening torque)

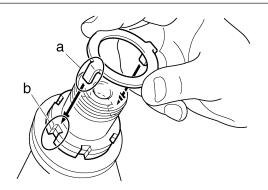
7 Nm (0.7 m•kg, 5.1 ft•lb)

- e. Install the rubber washer.
- f. Install the upper ring nut.
- g. Finger tighten the upper ring nut "2", then align the slots of both ring nuts. If necessary,

hold the lower ring nut and tighten the upper ring nut until their slots are aligned.

#### NOTE:

Make sure the special washer tabs "a" sit correctly in the ring nut slots "b".



## 5. Install:

- Upper bracket Refer to "STEERING HEAD" on page 4-49.
- Handlebar
   Refer to "HANDLEBAR" on page 4-34.

FAS21530

#### CHECKING THE FRONT FORK

1. Stand the vehicle on a level surface.

#### EWA13120

## **⚠** WARNING

Securely support the vehicle so that there is no danger of it falling over.

- 2. Check:
- Inner tube

Damage/scratches  $\rightarrow$  Replace.

- Oil seal
  - Oil leakage → Replace.
- 3. Hold the vehicle upright and apply the front brake.
- 4. Check:
  - Front fork operation

Push down hard on the handlebar several times and check if the front fork rebounds smoothly.

Rough movement  $\rightarrow$  Repair.

Refer to "FRONT FORK" on page 4-39.



EAS21580

#### ADJUSTING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

EWA32D1006

## **WARNING**

- Always adjust the left and right front forks evenly. If this is not done, the vehicle will have poor stability.
- Securely support the vehicle so that there is no danger of it falling over.

### Rebound damping

ECA13590

#### **CAUTION:**

Never go beyond the maximum or minimum adjustment positions.

- 1. Adjust:
- Rebound damping
- a. Turn the adjusting screw "1" in direction "a" or "b".

\*

Direction "a"

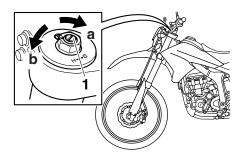
Rebound damping is increased (suspension is harder).

Direction "b"

Rebound damping is decreased (suspension is softer).



Rebound damping
Maximum (hard)
1click(s) out\*
Standard
10 click(s) out\*
Minimum (soft)
12 click(s) out\*
\* With the adjusting screw fully turned in



## Compression damping

ECA13590

#### **CAUTION:**

Never go beyond the maximum or minimum adjustment positions.

- 1. Adjust:
- Compression damping
- a. Turn the adjusting screw "1" in direction "a" or "b".

Direction "a"

Compression damping is increased (suspension is harder).

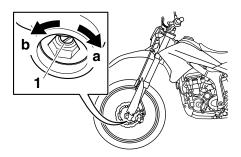
Direction "b"

Compression damping is decreased (suspension is softer).



Compression damping
Maximum (hard)
1 click(s) out\*
Standard
10 click(s) out\*
Minimum (soft)
19 click(s) out\*

\* With the adjusting screw fully turned in



EAS32D1020

#### AIR BLEEDING FROM FRONT FORK

When the temperature increases in the front fork

during touring, the air pressure increases in the fork and the suspension will become less flexible.

Bleed following procedure.

1. Stand the vehicle on a level surface.

EWA13

### **WARNING**

Securely support the vehicle so that there is no danger of it falling over.

#### NOTE:

Stand the vehicle vertically using an appropriate stand, and bleed the air from the front fork.

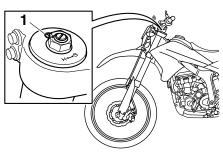
2. Bleed the air from the front fork.

Bleed the air from the front fork by removing bleed screw "1".

ECA32D1001

#### **CAUTION:**

- Always bleed the left and right front fork evenly.
- If this is not done, the vehicle will have poor stability.



- 3. Install:
  - Bleed screw



**Bleed screw** 

1.5 Nm (0.15 m•kg, 1.1 ft•lb)

EAS21610

## ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY

EWA13120

#### **WARNING**

Securely support the vehicle so that there is no danger of it falling over.

Spring preload

ECA13590

#### **CAUTION:**

Never go beyond the maximum or minimum adjustment positions.

- 1. Adjust:
- Spring preload

NOTE:\_

Remove the rear shock absorber from the vehi-

cle before this adjustment.

Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-53.

a. Adjust the spring preload with a ring nut wrench.



Ring nut wrench 90890-01268 Spanner wrench YU-01268

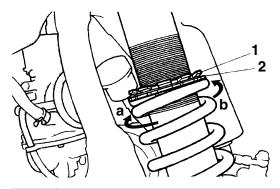
- b. Loosen the locknut "1".
- c. Turn the adjusting nut "2" in direction "a" or "b".

Direction "a"

Spring preload is increased (suspension is harder).

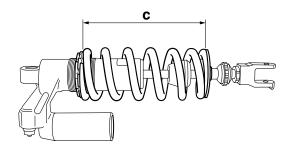
Direction "b"

Spring preload is decreased (suspension is softer).





Spring length "c"
Standard
211.5 mm (8.33 in)
Minimum (hard)
206 mm (8.11 in)
Maximum (soft)
216 mm (8.50 in)



d. Tighten the locknut.



Locknut 42 Nm (4.2 m•kg, 30 ft•lb)

## Rebound damping

ECA13590

#### **CAUTION:**

Never go beyond the maximum or minimum adjustment positions.

- 1. Adjust:
- Rebound damping
- a. Turn the adjusting knob "1" in direction "a" or "b".

Direction "a"

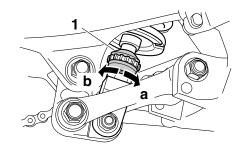
Rebound damping is increased (suspension is harder).

Direction "b"

Rebound damping is decreased (suspension is softer).



Rebound damping
Maximum (hard)
3 click(s) out\*
Standard
12 click(s) out\* (WR250R)
13 click(s) out\* (WR250X)
Minimum (soft)
25 click(s) out\*
\* With the adjusting knob fully turned in



## Compression damping

ECA13590

#### **CAUTION:**

Never go beyond the maximum or minimum adjustment positions.

- 1. Adjust:
- Compression damping

a. Turn the adjusting screw "1" in direction "a" or "b".

\*\*\*\*\*\*\*\*\*\*

Direction "a"

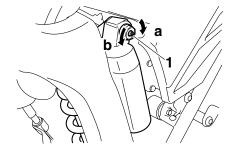
Compression damping is increased (suspension is harder).

Direction "b"

Compression damping is decreased (suspension is softer).



Compression damping
Maximum (hard)
1 click(s) out\*
Standard
10 click(s) out\* (WR250R)
7 click(s) out\* (WR250X)
Minimum (soft)
12 click(s) out\*
\* With the adjusting screw fully turned in



EAS21650

#### **CHECKING THE TIRES**

The following procedure applies to both of the tires.

\_\_\_\_

- 1. Check:
- Tire pressure
   Out of specification → Regulate.



EWA13180

## **WARNING**

 The tire pressure should only be checked and regulated when the tire temperature equals the ambient air temperature.

- The tire pressure and the suspension must be adjusted according to the total weight (including cargo, rider, passenger and accessories) and the anticipated riding speed.
- Operation of an overloaded vehicle could cause tire damage, an accident or an injury.
   NEVER OVERLOAD THE VEHICLE.



Loading condition 0-90 (0-198 lb) Tire air pressure (measured on cold tires) Loading condition 0-90 kg (0-198 lb) Front WR250R 125 kPa (18 psi) (1.25 kgf/cm<sup>2</sup>) WR250X 200 kPa (29 psi) (2.00 kgf/cm<sup>2</sup>) Rear WR250R 175 kPa (25 psi) (1.75 kgf/cm<sup>2</sup>) WR250X 200 kPa (29 psi) (2.00 kqf/cm<sup>2</sup>) Loading condition 90-185 kg (198-408 lb) Front WR250R 150 kPa (22 psi) (1.50 kgf/cm<sup>2</sup>) WR250X 200 kPa (29 psi) (2.00 kgf/cm<sup>2</sup>) Rear WR250R 200 kPa (29 psi) (2.00 kqf/cm<sup>2</sup>) WR250X 225 kPa (33 psi) (2.25 kgf/cm<sup>2</sup>) **Maximum load** 185 kg (408 lb)

EWA13190

## **WARNING**

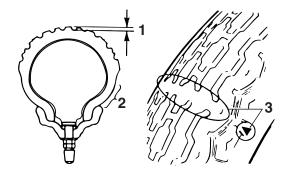
It is dangerous to ride with a worn-out tire. When the tire tread reaches the wear limit, replace the tire immediately.

\* Total weight of rider, passenger, cargo

- 2. Check:
- Tire surfaces

Damage/wear  $\rightarrow$  Replace the tire.

and accessories



- 1. Tire tread depth
- 2. Side wall
- 3. Wear indicator

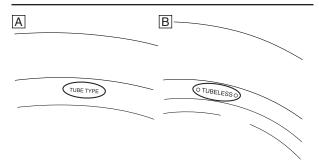


Wear limit (front) 0.8 mm (0.03 in) Wear limit (rear) 0.8 mm (0.03 in)

#### EWA14080

### **WARNING**

- Do not use a tubeless tire on a wheel designed only for tube tires to avoid tire failure and personal injury from sudden deflation.
- When using a tube tire, be sure to install the correct tube.
- Always replace a new tube tire and a new tube as a set.
- To avoid pinching the tube, make sure the wheel rim band and tube are centered in the wheel groove.
- Patching a punctured tube is not recommended. If it is absolutely necessary to do so, use great care and replace the tube as soon as possible with a good quality replacement.



- A. Tube wheel
- B. Tubeless wheel

| Tube wheel     | Tube tire only        |
|----------------|-----------------------|
| Tubeless wheel | Tube or tubeless tire |

#### WA14090

### **⚠** WARNING

After extensive tests, the tires listed below have been approved by Yamaha Motor Co., Ltd. for this model. The front and rear tires should always be by the same manufacturer and of the same design. No guarantee concerning handling characteristics can be given if a tire combination other than one approved by Yamaha is used on this vehicle.



Front tire
Size
WR250R 80/100-21M/C 51P
WR250X 110/70R17M/C 54H
Manufacturer/model
WR250R
BRIDGESTONE/
TW-301 F
WR250X
BRIDGESTONE/
BT090F RADIAL G



Rear tire
Size
WR250R 120/80-18M/C 62P
WR250X 140/70R17M/C 66H
Manufacturer/model
WR250R BRIDGESTONE/
TW-302 F
WR250X BRIDGESTONE/
BT090R RADIAL G

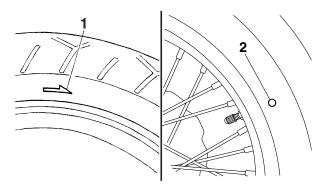
### EWA13210

## **⚠** WARNING

New tires have a relatively low grip on the road surface until they have been slightly worn. Therefore, approximately 100 km should be traveled at normal speed before any high-speed riding is done.

#### NOTE:

- For tires with a direction of rotation mark "1": Install the tire with the mark pointing in the direction of wheel rotation.
- Align the mark "2" with the valve installation point.



#### **CHECKING THE WHEELS**

The following procedure applies to both of the wheels.

- 1. Check:
- Wheel

Damage/out-of-round  $\rightarrow$  Replace.

EWA13260

## **WARNING**

Never attempt to make any repairs to the wheel.

#### NOTE: \_

After a tire or wheel has been changed or replaced, always balance the wheel.

EAS21680

#### **CHECKING AND TIGHTENING THE SPOKES**

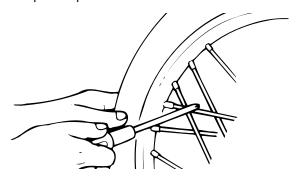
The following procedure applies to all of the spokes.

- 1. Check:
- Spoke

Bends/damage  $\rightarrow$  Replace.

Loose  $\rightarrow$  Tighten.

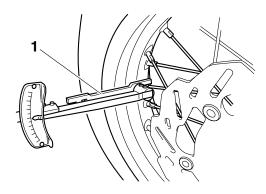
Tap the spokes with a screwdriver.



NOTE:

A tight spoke will emit a clear, ringing tone; a loose spoke will sound flat.

- 2. Tighten: (front/rear)
  - Spoke (with a spoke nipple wrench "1")





Spoke nipple wrench (8–9) 90890-01522 YM-01522



Spoke (front/rear) 3 Nm (0.3 m•kg, 2.2 ft•lb)

#### NOTE:

Be sure to tighten the spokes before and after break-in.

-AS21690

## CHECKING AND LUBRICATING THE

The following procedure applies to all of the inner and outer cables.

EWA13270

## **WARNING**

Damaged outer cable may cause the cable to corrode and interfere with its movement. Replace damaged outer cable and inner cables as soon as possible.

- 1. Check:
- Outer cable
   Damage → Replace.
- 2. Check:
  - Cable operation
     Rough movement → Lubricate.



Recommended lubricant
Engine oil or a suitable cable lubricant

#### NOTE:

Hold the cable end upright and pour a few drops of lubricant into the cable sheath or use a suitable lubricating device.

FAS21700

#### **LUBRICATING THE LEVERS**

Lubricate the pivoting point and metal-to-metal moving parts of the levers.



Brake lever
Silicone grease
Clutch lever
Lithium-soap-based grease

EAS21710

### **LUBRICATING THE PEDAL**

Lubricate the pivoting point and metal-to-metal moving parts of the pedal.



Recommended lubricant Lithium-soap-based grease

EAS21720

#### **LUBRICATING THE SIDESTAND**

Lubricate the pivoting point and metal-to-metal moving parts of the sidestand.



Recommented lubricant Lithium-soap-based grease

#### **ELECTRICAL SYSTEM**

EAS21760

CHECKING AND CHARGING THE BATTERY Refer to "ELECTRICAL COMPONENTS" on page 8-59.

EAS21770

### **CHECKING THE FUSES**

Refer to "ELECTRICAL COMPONENTS" on page 8-59.

EAS21780

#### REPLACING THE HEADLIGHT BULB

WA13320

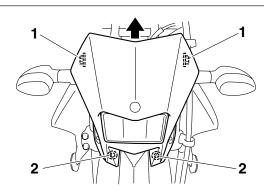
## **WARNING**

Since the headlight bulb gets extremely hot, keep flammable products and your hands away from the bulb until it has cooled down.

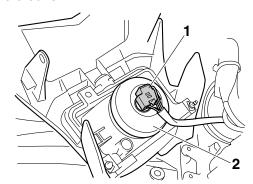
- 1. Remove:
- Headlight unit bolt "1"

#### NOTE:

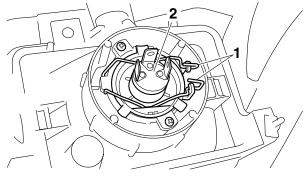
After you have removed the headlight unit bolts, lift and remove the headlight unit from front fender grommet "2".



- 2. Remove:
  - Headlight coupler "1"
  - Bulb cover "2"



- 3. Remove:
- Headlight bulb holder "1"
- Headlight bulb "2"



- 4. Install:
  - Headlight bulb
     Fasten the new headlight bulb with the headlight bulb holder.

ECA13690

#### **CAUTION:**

Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.

- 5. Install:
  - Headlight bulb holder
- Bulb cover
- Headlight coupler
- 6. Install:
- Headlight unit



Headlight unit bolt 7 Nm (0.7 m•kg, 5.1 ft•lb)

EAS2180

#### ADJUSTING THE HEADLIGHT BEAM

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

- 1. Adjust:
- Headlight beam (vertically)

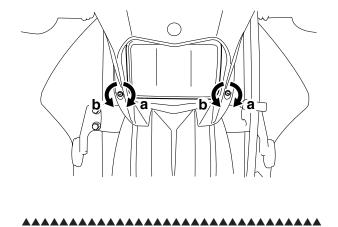
a. Turn the adjusting screw "1" in direction "a" or "b".

Direction "a"

Headlight beam is raised.

Direction "b"

Headlight beam is lowered.

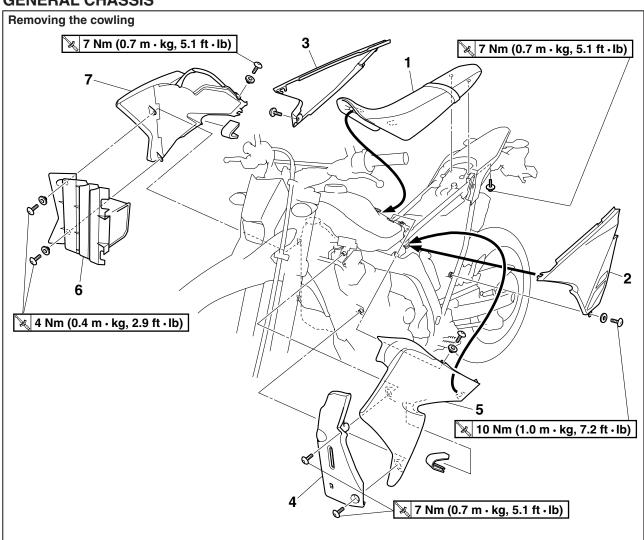


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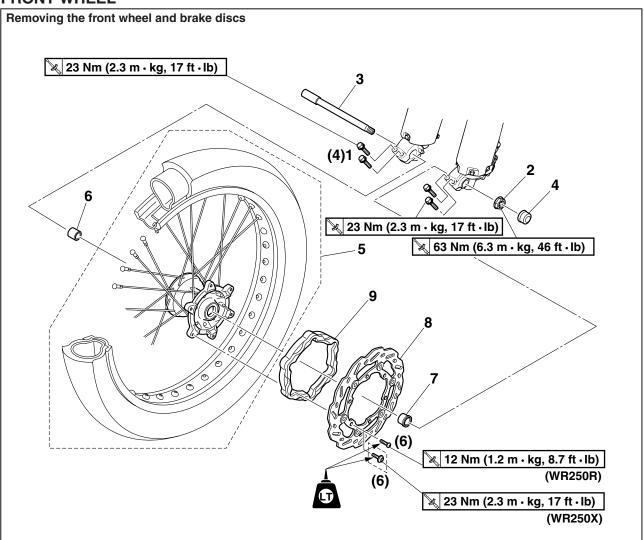
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# **GENERAL CHASSIS**



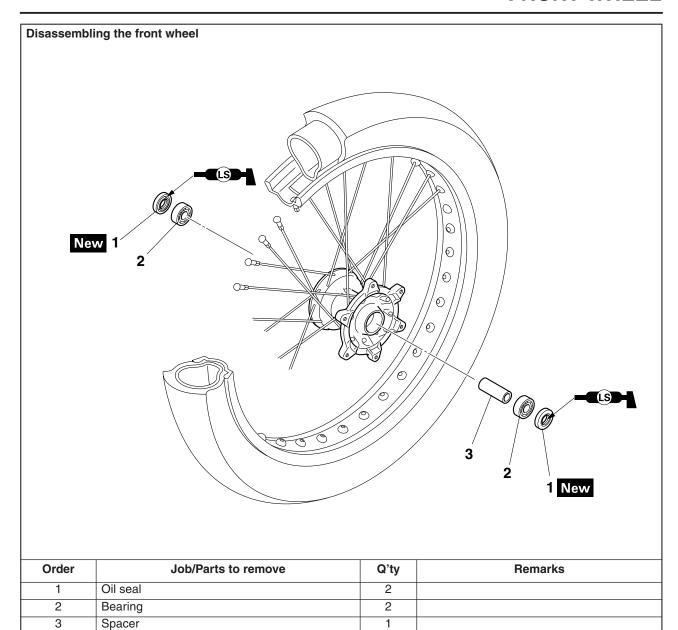
| Order | Job/Parts to remove | Q'ty | Remarks  |
|-------|---------------------|------|--|
| 1     | Seat                | 1    |  |
| 2     | Left side cover     | 1    |  |
| 3     | Right side cover    | 1    |  |
| 4     | Left air panel      | 1    |  |
| 5     | Left air scoop      | 1    |  |
| 6     | Right air panel     | 1    |  |
| 7     | Right air scoop     | 1    |  |
|       |                     |      | For installation, reverse the removal procedure. |

# **FRONT WHEEL**



| Order | Job/Parts to remove         | Q'ty | Remarks   |
|-------|-----------------------------|------|---|
|       |                             |      | Use a suitable stand to raise the front wheel off the ground. |
| 1     | Front wheel axle pinch bolt | 4    | Loosen.   |
| 2     | Front wheel axle nut        | 1    |   |
| 3     | Front wheel axle            | 1    |   |
| 4     | Сар                         | 1    | For Europe  |
| 5     | Front wheel assembly        | 1    |   |
| 6     | Collar                      | 1    |   |
| 7     | Collar                      | 1    |   |
| 8     | Front brake disc            | 1    |   |
| 9     | Wheel ring                  | 1    | Only WR250R   |
|       |                             |      | For installation, reverse the removal procedure.              |

For assembly, reverse the disassembly procedure.



### REMOVING THE FRONT WHEEL

1. Stand the vehicle on a level surface.

EWA13120

# **⚠** WARNING

Securely support the vehicle so that there is no danger of it falling over.

#### NOTE:

Place the vehicle on a suitable stand so that the front wheel is elevated.

### 2. Remove:

Front wheel

#### NOTE:

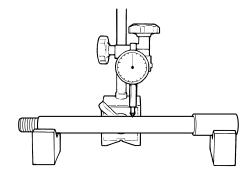
Place the vehicle on a suitable stand so that the front wheel is elevated.

EAS21930

# **CHECKING THE FRONT WHEEL**

- 1. Check:
- Wheel axle

Roll the wheel axle on a flat surface. Bends  $\rightarrow$  Replace.



EWA13460

## **WARNING**

Do not attempt to straighten a bent wheel axle.

- 2. Check:
  - Tire
  - Front wheel

 $Damage/wear \rightarrow Replace.$ 

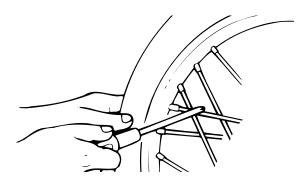
Refer to "CHECKING THE TIRES" on page 1-31 and "CHECKING THE WHEELS" on page 1-33.

- 3. Check:
  - Spokes

Bends/damage  $\rightarrow$  Replace.

Loose  $\rightarrow$  Tighten.

Tap the spokes with a screwdriver.



NOTE:

A tight spoke will emit a clear, ringing tone, a loose spoke will sound flat.

- 4. Tighten:
  - Spokes Refer to "CHECKING AND TIGHTENING THE SPOKES" on page 1-33.

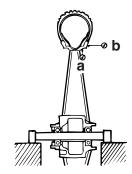


# Spoke 3 Nm (0.3 m•kg, 2.2 ft•lb)

NOTF:

After tightening the spokes, measure the front wheel runout.

- 5. Measure:
  - Front wheel radial runout "a"
  - Front wheel lateral runout "b"
     Over the specified limits → Replace.





Radial wheel runout limit 2.0 mm (0.08 in) Lateral wheel runout limit 2.0 mm (0.08 in)

- 6. Check:
- Collars

Damage/wear  $\rightarrow$  Replace.

- 7. Check:
- Wheel bearings

Front wheel turns roughly or is loose  $\rightarrow$  Replace the wheel bearings.

Oil seals

Damage/wear  $\rightarrow$  Replace.



### DISASSEMBLING THE FRONT WHEEL

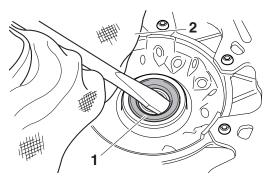
- 1. Remove:
- Oil seals
- Wheel bearings
- a. Clean the outside of the front wheel hub.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

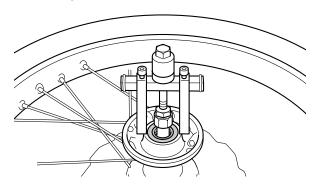
b. Remove the oil seals "1" with a flat-head screwdriver.

### NOTE:

To prevent damaging the wheel, place a rag "2" between the screwdriver and the wheel surface.



c. Remove the wheel bearings with a general bearing puller.



FAS21960

# **ASSEMBLING THE FRONT WHEEL**

- 1. Install:
- Wheel bearings

Oil seals New

a. Install the new wheel bearings and oil seals in the reverse order of disassembly.

\*\*\*\*\*\*\*\*

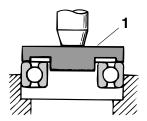
ECA14130

### **CAUTION:**

Do not contact the wheel bearing inner race or balls. Contact should be made only with the outer race.

#### NOTE:

Use a socket "1" that matches the diameter of the wheel bearing outer race and oil seal.



EAS22000

## **INSTALLING THE FRONT WHEEL (DISC)**

The following procedure applies to both of the brake discs.

- 1. Lubricate:
- Wheel axle
- Oil seal lips



Recommended lubricant Lithium-soap-based grease

- 2. Tighten:
  - Wheel axle nut "1"
  - Wheel axle pinch bolt

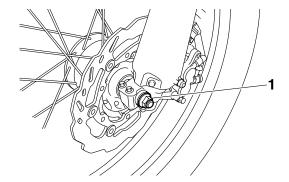
ECA14140

### **CAUTION:**

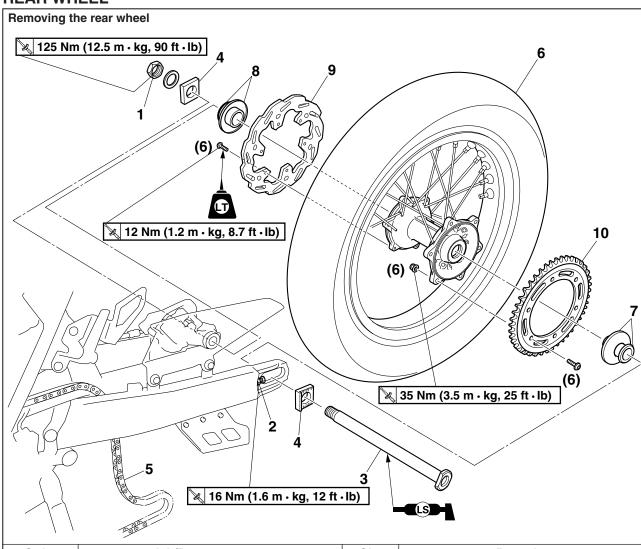
Before tightening the wheel axle nut, push down hard on the handlebar(s) several times and check if the front fork rebounds smoothly.



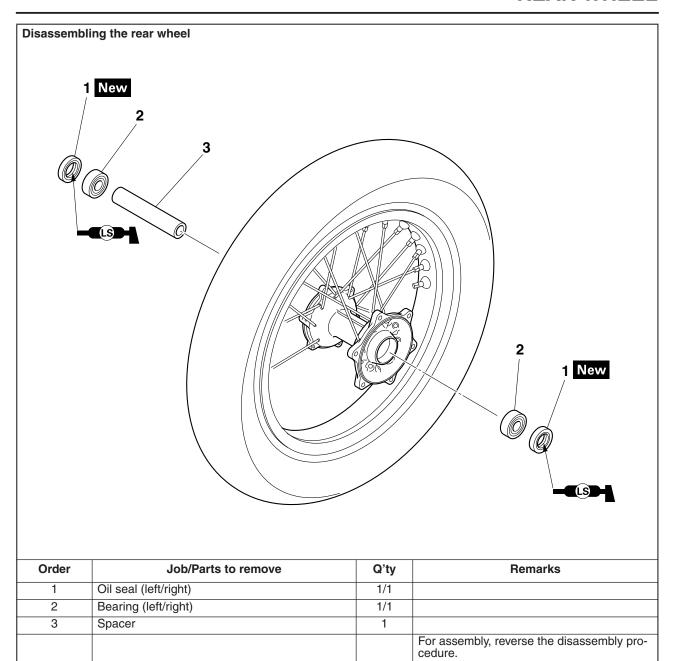
Wheel axle nut 63 Nm (6.3 m•kg, 46 ft•lb) Wheel axle pinch bolt 23 Nm (2.3 m•kg, 17 ft•lb)



# **REAR WHEEL**



| Order | Job/Parts to remove       | Q'ty | Remarks   |
|-------|---------------------------|------|---|
|       |                           |      | Use a suitable stand to raise the front wheel off the ground. |
| 1     | Rear wheel axle nut       | 1    |   |
| 2     | Locknut                   | 2    | It loosens and adjusting bolt is tightened fully.             |
| 3     | Rear wheel axle           | 1    |   |
| 4     | Chain puller (left/right) | 1/1  |   |
| 5     | Drive chain               | 1    |   |
| 6     | Rear wheel assembly       | 1    |   |
| 7     | Collar left/Dust cover    | 1/1  |   |
| 8     | Collar right/Dust cover   | 1/1  |   |
| 9     | Rear brake disc           | 1    |   |
| 10    | Rear wheel sprocket       | 1    |   |
|       |                           |      | For installation, reverse the removal procedure.              |



FAS22040

## REMOVING THE REAR WHEEL

1. Stand the vehicle on a level surface.

EWA13120

# **WARNING**

Securely support the vehicle so that there is no danger of it falling over.

NOTE:

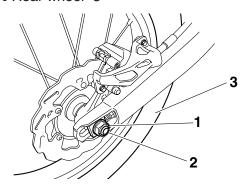
Place the vehicle on a suitable stand so that the rear wheel is elevated.

- 2. Elevate:
  - Rear wheel
- 3. Remove:
- Rear wheel axle nut "1"
- 4. Loosen:
- Locknut
- 5. Tighten:
  - Adjusting bolt

NOTE:

Place the motorcycle on a suitable stand so that the rear wheel is elevated.

- 6. Remove:
  - Wheel axle "2"
  - Rear wheel "3"



NOTE:

Push the rear wheel forward and remove the drive chain from the rear wheel sprocket.

EAS22080

#### DISASSEMBLING THE REAR WHEEL

- 1. Remove:
- Oil seals
- Wheel bearings
   Refer to "DISASSEMBLING THE FRONT WHEEL" on page 4-5.

EAS22100

### **CHECKING THE REAR WHEEL**

- 1. Check:
- Wheel axle
- Rear wheel
- Wheel bearings

Oil seals

Refer to "CHECKING THE FRONT WHEEL" on page 4-4.

- 2. Check:
  - Tire
  - Rear wheel

Damage/wear  $\rightarrow$  Replace.

Refer to "CHECKING THE TIRES" on page 1-31 and "CHECKING THE WHEELS" on page 1-33.

- 3. Check:
  - Spokes

Refer to "CHECKING THE FRONT WHEEL" on page 4-4.

- 4. Measure:
  - Radial wheel runout
- Lateral wheel runout Refer to "CHECKING THE FRONT WHEEL" on page 4-4.



Radial wheel runout limit 2.0 mm Lateral wheel runout limit 2.0 mm

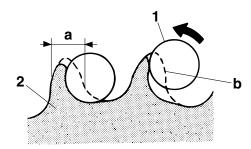
EAS2212

# CHECKING AND REPLACING THE REAR WHEEL SPROCKET

- 1. Check:
- Rear wheel sprocket

More than 1/4 tooth wear  $\rightarrow$  Replace the rear wheel sprocket.

Bent teeth  $\rightarrow$  Replace the rear wheel sprocket.



- a. Tooth face
- b. Normal
- 1. Drive chain roller
- 2. Rear wheel sprocket
- 2. Replace:
  - Rear wheel sprocket

 Remove the self-locking nuts and the rear wheel sprocket.

\*

- b. Clean the rear wheel drive hub with a clean cloth, especially the surfaces that contact the sprocket.
- c. Install the new rear wheel sprocket.

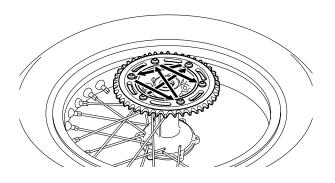


Rear wheel sprocket self-locking nut

35 Nm (3.5 m•kg, 25 ft•lb)

#### NOTE:

Tighten the self-locking nuts in stages and in a crisscross pattern.



FAS22140

### ASSEMBLING THE REAR WHEEL

- 1. Install:
- Wheel bearings
- Oil seals New Refer to "ASSEMBLING THE FRONT WHEEL" on page 4-5.

EAS22160

### **INSTALLING THE REAR WHEEL (DISC)**

- 1. Install:
- Brake disc
   Refer to "CHECKING THE REAR BRAKE DISC" on page 4-28
- 2. Lubricate:
  - Wheel axle
  - Oil seal lips



Recommended lubricant Lithium-soap-based grease

- 3. Adjust:
  - Drive chain slack
     Refer to "ADJUSTING THE DRIVE CHAIN SLACK" on page 1-26.



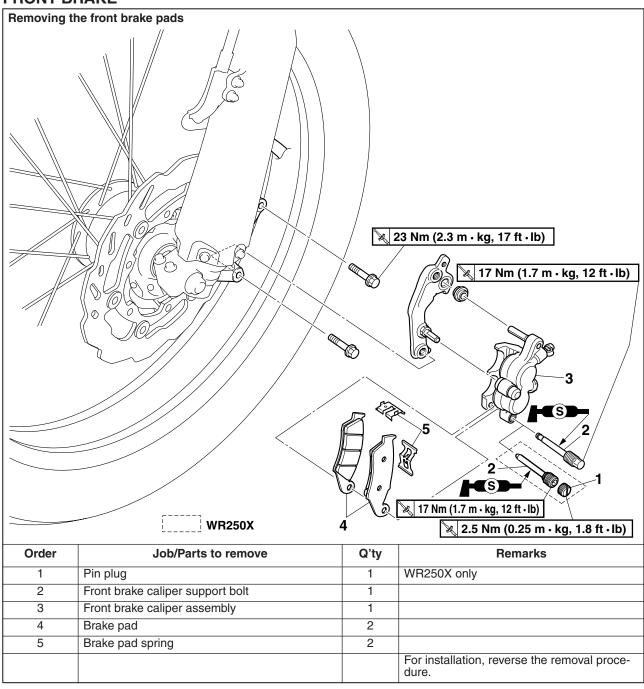
Drive chain slack WR250R 38.0–48.0 mm (1.50–1.89 in) WR250X 40.0–50.0 mm (1.57–1.97 in)

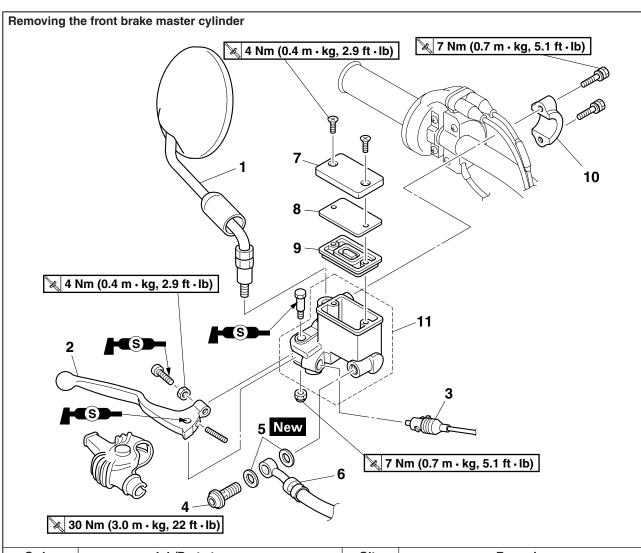
- 4. Tighten:
  - Wheel axle nut



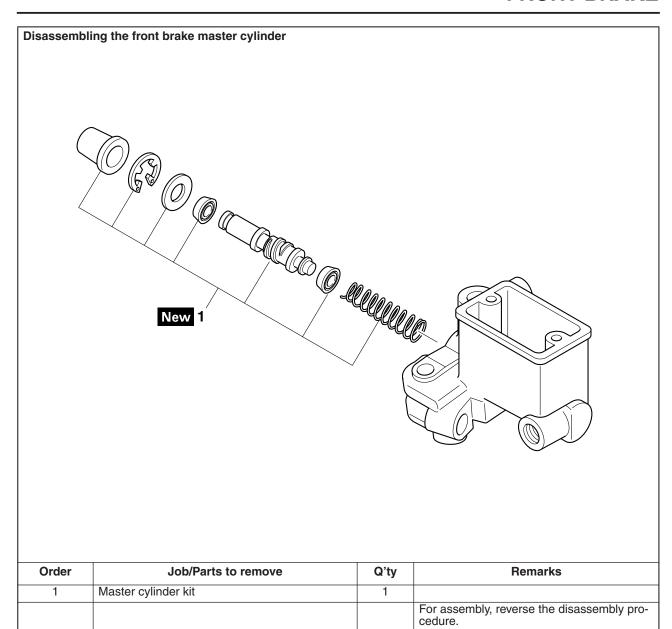
Wheel axle nut 125 Nm (12.5 m•kg, 90 ft•lb)

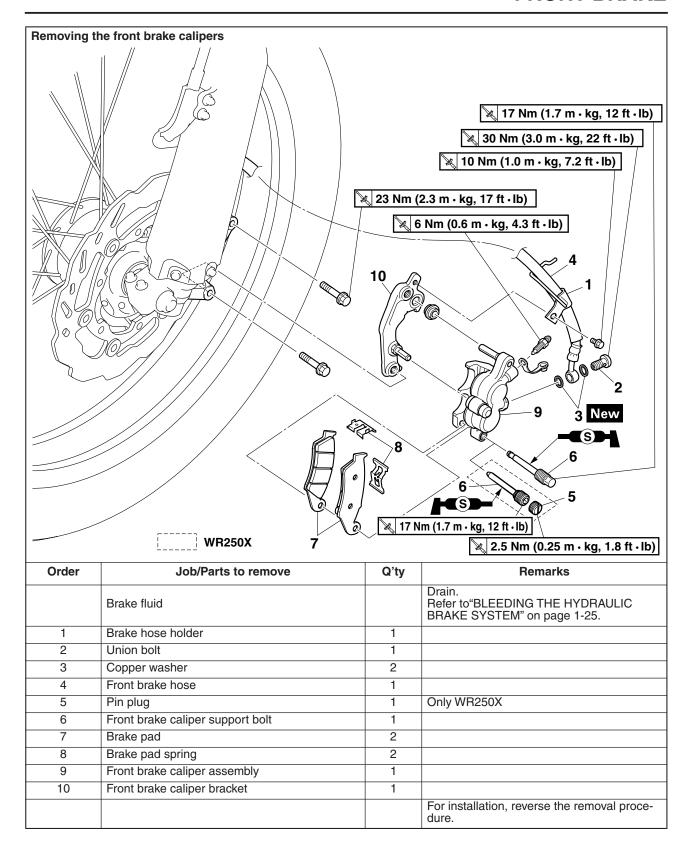
## **FRONT BRAKE**

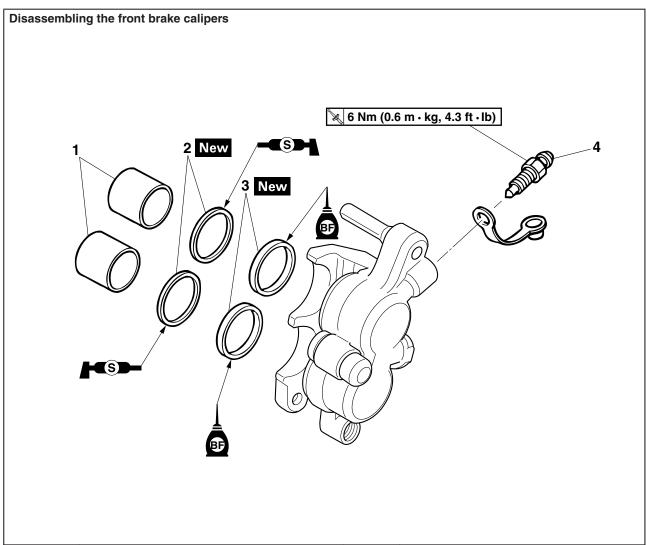




| Order | Job/Parts to remove                              | Q'ty | Remarks   |
|-------|--|------|---|
|       | Brake fluid                                      |      | Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 1-25. |
| 1     | Rear view mirror (right)                         | 1    |   |
| 2     | Brake lever                                      | 1    |   |
| 3     | Front brake switch                               | 1    |   |
| 4     | Union bolt                                       | 1    |   |
| 5     | Copper washer                                    | 2    |   |
| 6     | Front brake hose                                 | 1    |   |
| 7     | Brake master cylinder reservoir cap              | 1    |   |
| 8     | Brake master cylinder reservoir diaphragm holder | 1    |   |
| 9     | Brake master cylinder reservoir diaphragm        | 1    |   |
| 10    | Front brake master cylinder holder               | 1    |   |
| 11    | Front brake master cylinder                      | 1    |   |
|       |  |      | For installation, reverse the removal procedure.                    |







| Order | Job/Parts to remove       | Q'ty | Remarks  |
|-------|---------------------------|------|--|
| 1     | Brake caliper piston      | 2    |  |
| 2     | Brake caliper dust seal   | 2    |  |
| 3     | Brake caliper piston seal | 2    |  |
| 4     | Bleed screw               | 1    |  |
|       |                           |      | For assembly, reverse the disassembly procedure. |

FAS22220

### **INTRODUCTION**

EWA14100

# **M** WARNING

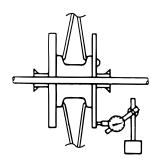
Disc brake components rarely require disassembly. Therefore, always follow these preventive measures:

- Never disassemble brake components unless absolutely necessary.
- If any connection on the hydraulic brake system is disconnected, the entire brake system must be disassembled, drained, cleaned, properly filled, and bled after reassembly.
- Never use solvents on internal brake components.
- Use only clean or new brake fluid for cleaning brake components.
- Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.
- Avoid brake fluid coming into contact with the eyes as it can cause serious injury.
- FIRST AID FOR BRAKE FLUID ENTERING THE EYES:
- Flush with water for 15 minutes and get immediate medical attention.

EAS22230

### CHECKING THE FRONT BRAKE DISC

- 1. Remove:
- Front wheel
   Refer to "FRONT WHEEL" on page 4-2.
- 2. Check:
  - Front brake disc
     Damage/galling → Replace.
- 3. Measure:
  - Brake disc deflection
     Out of specification → Correct the brake disc deflection or replace the brake disc.





Brake disc deflection limit 0.15 mm (0.0059 in)

a. Place the vehicle on a suitable stand so that the front wheel is elevated.

\*

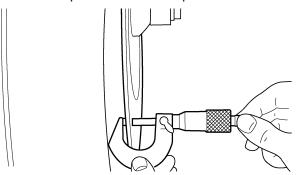
- b. Before measuring the front brake disc deflection, turn the handlebar to the left or right to ensure that the front wheel is stationary.
- c. Remove the brake caliper.
- d. Hold the dial gauge at a right angle against the brake disc surface.
- e. Measure the deflection front 10 mm (0.39 in), rear 7 mm (0.28 in) below the edge of the brake disc.

# 

- 4. Measure:
- Brake disc thickness

Measure the brake disc thickness at a few different locations.

Out of specification  $\rightarrow$  Replace.



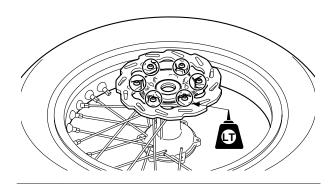


Brake disc thickness limit WR250R 3.0 mm (0.12 in) WR250X 3.5 mm (0.14 in)

- 5. Adjust:
- Brake disc deflection
- a. Remove the brake disc.
- b. Turn the brake disc by one bolt hole.
- c. Install the brake disc.

NOTE:

Tighten the brake disc bolts in stages and in a crisscross pattern.





Brake disc bolt

WR250R:12 Nm (1.2 m•kg, 8.7

ft•lb)

**LOCTITE®** 

WR250X:23 Nm (2.3 m•kg, 17

ft•lb)

**LOCTITE®** 

- d. Measure the brake disc deflection.
- e. If out of specification, repeat the adjustment steps until the brake disc deflection is within specification.
- f. If the brake disc deflection cannot be brought within specification, replace the brake disc.

- 6. Install:
  - Front wheel Refer to "FRONT WHEEL" on page 4-2.

FAS22280

# REPLACING THE FRONT BRAKE PADS NOTE:

When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.

- 1. Measure:
- Brake pad wear limit "a"
   Out of specification → Replace the brake pads as a set.



Brake pad lining thickness (inner) WR250R 4.8 mm (0.19 in) WR250X 4.0 mm (0.16 in)

Limit

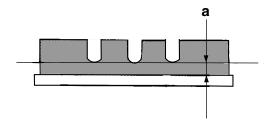
1.0 mm (0.04 in)

Brake pad lining thickness (outer) WR250R 4.8 mm (0.19 in)

WR250X 4.0 mm (0.16 in)

Limit

1.0 mm (0.04 in)

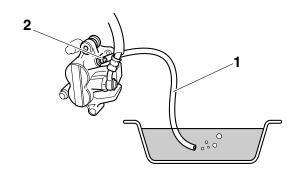


- 2. Install:
- Brake pads
- Brake pad spring

NOTE:

Always install new brake pads, and a brake pad spring as a set.

a. Connect a clear plastic hose "1" tightly to the bleed screw "2". Put the other end of the hose into an open container.



- Loosen the bleed screw and push the brake caliper pistons into the brake caliper with your finger.
- c. Tighten the bleed screw.



Bleed screw 6 Nm (0.6 m•kg, 4.3 ft•lb)

 d. Install new brake pads and a new brake pad spring.

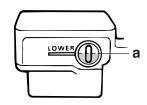
- 3. Install:
- Brake pad pins
- Brake pad clips
- Brake pad cover
- Brake caliper



Brake caliper bolt 23 Nm (2.3 m•kg, 17 ft•lb)

#### 4. Check:

Brake fluid level
Below the minimum level mark "a" → Add the
recommended brake fluid to the proper level.
Refer to "CHECKING THE BRAKE FLUID
LEVEL" on page 1-23.



#### 5. Check:

- Brake lever free play Refer to "ADJUSTING THE FRONT DISC BRAKE" on page 1-22.
- Brake pedal operation
   Soft or spongy feeling → Bleed the brake
   system.
   Refer to "BLEEDING THE HYDRAULIC

EAS22290

### REMOVING THE FRONT BRAKE CALIPER

BRAKE SYSTEM" on page 1-25.

NOTE:

Before disassembling the brake caliper, drain the brake fluid from the entire brake system.

- 1. Remove:
- Union bolt
- Copper washers
- Brake hose

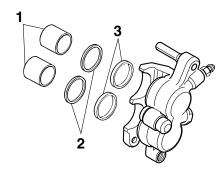
NOTE: \_

Put the end of the brake hose into a container and pump out the brake fluid carefully.

FAS2232

# DISASSEMBLING THE FRONT BRAKE CALIPER

- 1. Remove:
- Brake caliper pistons "1"
- Brake caliper dust seals "2"
- Brake caliper piston seals "3"

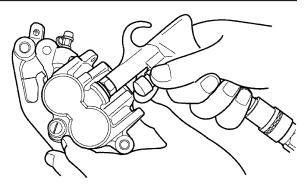


 a. Blow compressed air into the brake hose joint opening to force out the pistons from the brake caliper.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

WARNING

- Cover the brake caliper piston with a rag.
   Be careful not to get injured when the piston is expelled from the brake caliper.
- Never try to pry out the brake caliper piston.



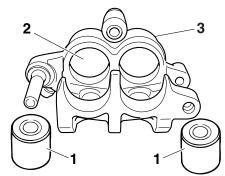
Remove the dust seals and brake caliper piston seals.

### CHECKING THE FRONT BRAKE CALIPER

| Recommended brake component replacement schedule |  |  |
|--|--|--|
| Brake pads                                       | If necessary   |  |
| Piston seals                                     | Every two years  |  |
| Brake hoses                                      | Every four years                                       |  |
| Brake fluid                                      | Every two years and whenever the brake is disassembled |  |

- 1. Check:
- Brake caliper pistons "1"
   Rust/scratches/wear → Replace the brake caliper pistons.

- Brake caliper cylinders "2"
   Scratches/wear → Replace the brake caliper assembly.
- Brake caliper body "3"
   Cracks/damage → Replace the brake caliper assembly.
- Brake fluid delivery passages (brake caliper body)
   Obstruction → Blow out with compressed air.



EWA13600

## **⚠** WARNING

Whenever a brake caliper is disassembled, replace the piston seals.

- 2. Check:
  - Brake caliper bracket
     Cracks/damage → Replace.

EAS22400

# ASSEMBLING THE FRONT BRAKE CALIPER

## **WARNING**

- Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.
- Never use solvents on internal brake components as they will cause the piston seals to swell and distort.
- Whenever a brake caliper is disassembled, replace the brake caliper piston seals.



Recommended fluid DOT 4

EAS22420

### **INSTALLING THE FRONT BRAKE CALIPER**

- 1. Install:
- Front brake caliper bracket
- Front brake caliper (temporarily)
- Copper washers New
- Brake hose
- Union bolt



Front brake caliper bracket 23 Nm (2.3 m•kg, 17 ft•lb) Brake hose union bolt 30 Nm (30. m•kg, 22 ft•lb)

EWA13530

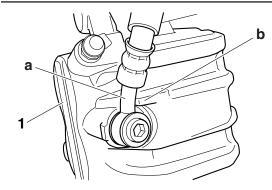
## **WARNING**

Proper brake hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" on page 2-30.

ECA14170

### **CAUTION:**

When installing the brake hose onto the brake caliper "1", make sure the brake pipe "a" touches the projection "b" on the brake caliper.



- 2. Install:
- Front brake caliper
- Brake pad springs
- Front brake caliper support bolt
- Brake hose holder



Front brake caliper support bolt 17 Nm (1.7 m•kg, 12 ft•lb) Brake hose holder 10 Nm (1.0 m•kg, 7.2 ft•lb)

Refer to "REPLACING THE FRONT BRAKE PADS" on page 4-17.

- 3. Fill:
  - Brake master cylinder reservoir (with the specified amount of the recommended brake fluid)



Recommended fluid DOT 4

EWA13090

## **⚠** WARNING

 Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.

- Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.
- When refilling, be careful that water does not enter the brake fluid reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.

ECA13540

# **CAUTION:**

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

- 4. Bleed:
  - Brake system
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 1-25.
- 5. Check:
  - Brake fluid level
     Below the minimum level mark → Add the
     recommended brake fluid to the proper level.
     Refer to "CHECKING THE BRAKE FLUID
     LEVEL" on page 1-23.
- 6. Check:
  - Brake lever free play Refer to "ADJUSTING THE FRONT DISC BRAKE" on page 1-22.
- Brake lever operation
   Soft or spongy feeling → Bleed the brake
   system.
   Refer to "BLEEDING THE HYDRAULIC
   BRAKE SYSTEM" on page 1-25.

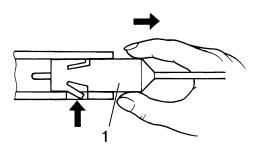
EAS22490

# REMOVING THE FRONT BRAKE MASTER CYLINDER

NOTE: \_

Before removing the front brake master cylinder, drain the brake fluid from the entire brake system.

- 1. Disconnect:
- Brake switch coupler "1" (from the brake master cylinder)



- 2. Remove:
- Union bolt
- Copper washers
- Brake hoses

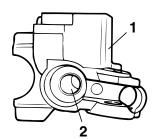
#### NOTE:

To collect any remaining brake fluid, place a container under the master cylinder and the end of the brake hose.

EAS22500

# CHECKING THE FRONT BRAKE MASTER CYLINDER

- 1. Check:
  - Brake master cylinder "1"
     Damage/scratches/wear → Replace.
  - Brake fluid delivery passages "2" (brake master cylinder body)
     Obstruction → Blow out with compressed air.



- 2. Check:
  - Brake master cylinder kit Damage/scratches/wear → Replace.
- 3. Check:
- Brake master cylinder reservoir cap
- 4. Check:
  - Brake master cylinder reservoir diaphragm holder
  - Brake master cylinder reservoir diaphragm holder
     Cracks/damage → Replace.
- 5. Check:
  - Brake hoses
     Cracks/damage/wear → Replace.

# ASSEMBLING THE FRONT BRAKE MASTER CYLINDER

EWA13520

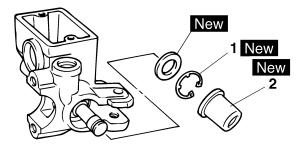
# **WARNING**

- Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.
- Never use solvents on internal brake components.



# Recommended fluid DOT 4

- 1. Install:
- Master cylinder cup
- Master cylinder piston
- 2. Install:
- Circlip "1" New
- Dust boot "2" New



EAS22530

# INSTALLING THE FRONT BRAKE MASTER CYLINDER

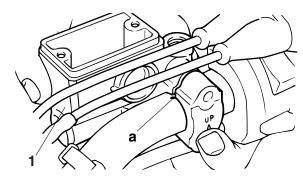
- 1. Install:
- Brake master cylinder "1"



Brake master cylinder holder bolt 7 Nm (0.7 m•kg, 5.1 ft•lb)

#### NOTE:

- Install the brake master cylinder holder with the "UP" mark facing up.
- Align the end of the brake master cylinder holder with the punch mark "a" on the handlebar.
- First, tighten the upper bolt, then the lower bolt.



- 2. Install:
  - Copper washers "1" New
  - Brake hose "2"
  - Union bolt "3"



Brake hose union bolt 30 Nm (30. m•kg, 22 ft•lb)

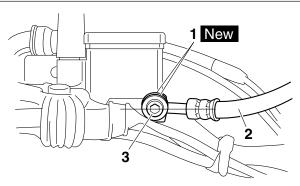
EWA1353

# **WARNING**

Proper brake hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" on page 2-30.

#### NOTE

- While holding the brake hose, tighten the union bolt as shown.
- Turn the handlebar to the left and right to make sure the brake hose does not touch other parts (e.g., wire harness, cables, leads). Correct if necessary.



- 3. Fill:
  - Brake master cylinder reservoir (with the specified amount of the recommended brake fluid)



Recommended fluid DOT 4

WARNING

 Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.

- Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.
- When refilling, be careful that water does not enter the brake master cylinder reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.

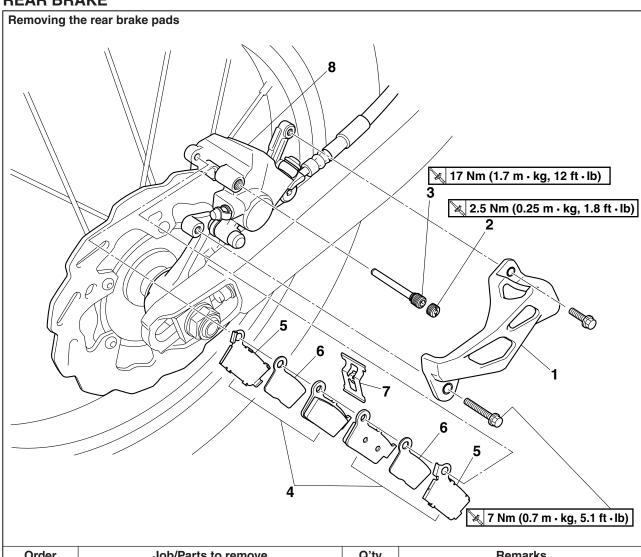
ECA13540

#### **CAUTION:**

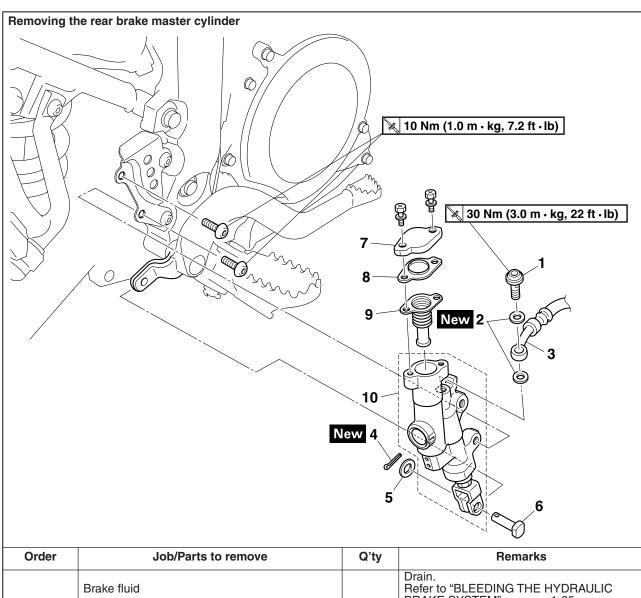
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

- 4. Bleed:
  - Brake system
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 1-25.
- 5. Check:
  - Brake fluid level
     Below the minimum level mark → Add the
     recommended brake fluid to the proper level.
     Refer to "CHECKING THE BRAKE FLUID
     LEVEL" on page 1-23.
- 6. Check:
  - Brake lever free play Refer to "ADJUSTING THE FRONT DISC BRAKE" on page 1-22.
- Brake lever operation
   Soft or spongy feeling → Bleed the brake
   system.
   Refer to "BLEEDING THE HYDRAULIC
   BRAKE SYSTEM" on page 1-25.

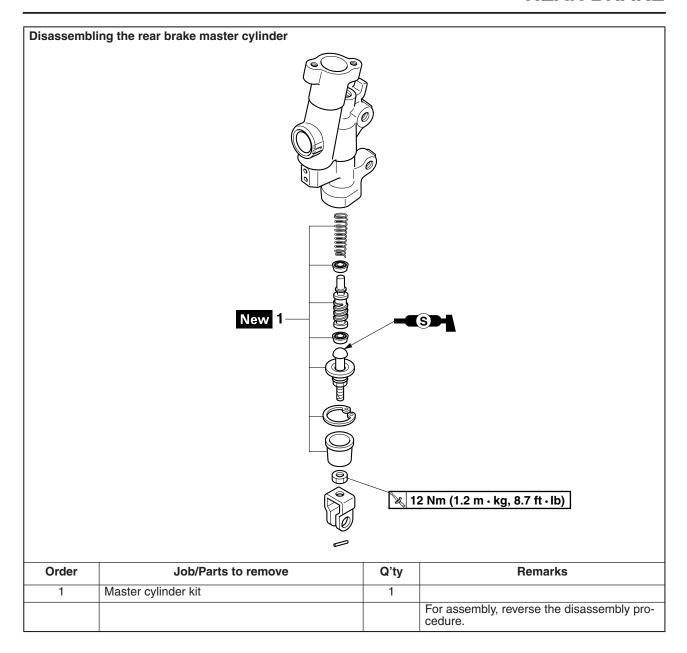
# **REAR BRAKE**

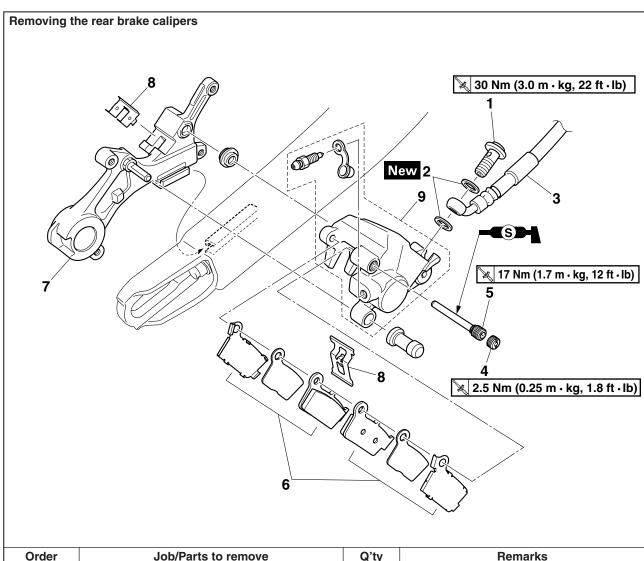


| Order | Job/Parts to remove         | Q'ty | Remarks  |
|-------|-----------------------------|------|--|
|       | Rear wheel                  |      | Refer to "REAR WHEEL" on page 4-7.               |
| 1     | Protector                   | 1    |  |
| 2     | Pin plug                    | 1    |  |
| 3     | Brake pad support bolt      | 1    |  |
| 4     | Rear brake pad              | 2    |  |
| 5     | Pad shim                    | 2    |  |
| 6     | Insulator                   | 2    |  |
| 7     | Rear brake pad spring       | 1    |  |
| 8     | Rear brake caliper assembly | 1    |  |
|       |                             |      | For installation, reverse the removal procedure. |

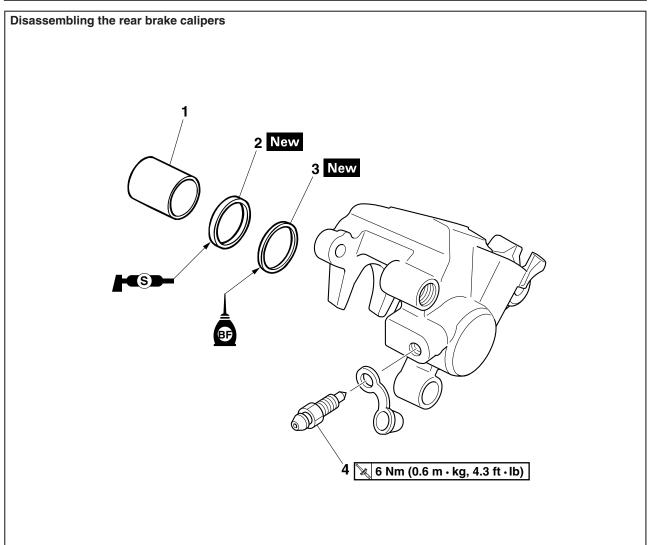


| Order | Job/Parts to remove                             | Q'ty | Remarks   |
|-------|---|------|---|
|       | Brake fluid                                     |      | Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 1-25. |
| 1     | Union bolt                                      | 1    |   |
| 2     | Copper washer                                   | 2    |   |
| 3     | Brake hose                                      | 1    |   |
| 4     | Split pin                                       | 1    |   |
| 5     | Plain washer                                    | 1    |   |
| 6     | Pin   | 1    |   |
| 7     | Brake master cylinder reservoir cap             | 1    |   |
| 8     | Brake master cylinder reservoir diaphragm plate | 1    |   |
| 9     | Brake master cylinder reservoir diaphragm       | 1    |   |
| 10    | Rear brake master cylinder                      | 1    |   |
|       |   |      | For installation, reverse the removal procedure.                    |





| Order | Job/Parts to remove         | Q'ty | Remarks   |
|-------|-----------------------------|------|---|
|       | Brake fluid                 |      | Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 1-25. |
|       | Protector                   |      | Refer to "REAR BRAKE" on page 4-23.                                 |
| 1     | Union bolt                  | 1    |   |
| 2     | Copper washer               | 2    |   |
| 3     | Rear brake hose             | 1    |   |
| 4     | Pin plug                    | 1    |   |
| 5     | Brake caliper support bolt  | 1    |   |
| 6     | Rear brake pad assemblyl    | 2    |   |
| 7     | Rear brake caliper bracket  | 1    |   |
| 8     | Brake pad spring            | 2    |   |
| 9     | Rear brake caliper assembly | 1    |   |
|       |                             |      | For installation, reverse the removal procedure.                    |



| Order | Job/Parts to remove       | Q'ty | Remarks  |
|-------|---------------------------|------|--|
| 1     | Brake caliper piston      | 1    |  |
| 2     | Brake caliper dust seal   | 1    |  |
| 3     | Brake caliper piston seal | 1    |  |
| 4     | Bleed screw               | 1    |  |
|       |                           |      | For assembly, reverse the disassembly procedure. |

### INTRODUCTION

EWA14100

# **WARNING**

Disc brake components rarely require disassembly. Therefore, always follow these preventive measures:

- Never disassemble brake components unless absolutely necessary.
- If any connection on the hydraulic brake system is disconnected, the entire brake system must be disassembled, drained, cleaned, properly filled, and bled after reassembly.
- Never use solvents on internal brake components.
- Use only clean or new brake fluid for cleaning brake components.
- Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.
- Avoid brake fluid coming into contact with the eyes as it can cause serious injury.
- FIRST AID FOR BRAKE FLUID ENTERING THE EYES:
- Flush with water for 15 minutes and get immediate medical attention.

EAS2257

### **CHECKING THE REAR BRAKE DISC**

- 1. Remove:
- Rear wheel Refer to "REAR WHEEL" on page 4-7.
- 2. Check:
  - Brake disc
     Damage/galling → Replace.
- 3. Measure:
  - Brake disc deflection

Out of specification  $\rightarrow$  Correct the brake disc deflection or replace the brake disc.

Refer to "CHECKING THE FRONT BRAKE DISC" on page 4-16.



Brake disc deflection limit 0.15 mm (0.0059 in)

- 4. Measure:
  - Brake disc thickness

Measure the brake disc thickness at a few different locations.

Out of specification  $\rightarrow$  Replace.

Refer to "CHECKING THE FRONT BRAKE DISC" on page 4-16.



Brake disc thickness limit 4.0 mm (0.16 in)

### 5. Adjust:

 Brake disc deflection
 Refer to "CHECKING THE FRONT BRAKE DISC" on page 4-16.



Brake disc bolt 12 Nm (1.2 m•kg, 8.7 ft•lb) LOCTITE®

### 6. Install:

 Rear wheel Refer to "REAR WHEEL" on page 4-7.

EAS22580

### REPLACING THE REAR BRAKE PADS

NOTE:

When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.

- 1. Measure:
  - Brake pad wear limit "a"
     Out of specification → Replace the brake pads as a set.



Brake pad lining thickness (inner)
6.4 mm (0.25 in)
Limit
1.0 mm (0.04 in)
Brake pad lining thickness (outer)
6.4 mm (0.25 in)
Limit
1.0 mm (0.04 in)



### 2. Install:

- Brake pad shims (onto the brake pads)
- Brake pads
- Brake pad spring

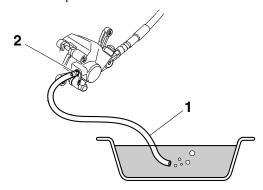
#### NOTE:

Always install new brake pads, brake pad shims,

and a brake pad spring as a set.

a. Connect a clear plastic hose "1" tightly to the bleed screw "2". Put the other end of the hose into an open container.

\*



- Loosen the bleed screw and push the brake caliper pistons into the brake caliper with your finger.
- c. Tighten the bleed screw.



Bleed screw 6 Nm (0.6 m•kg, 4.3 ft•lb)

- d. Install a new brake pad shim onto each new brake pad.
- e. Install new brake pads and a new brake pad spring.

NOTE:

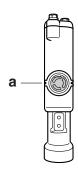
The longer tangs "b" of the brake pad spring must point in the direction of disc rotation.

- 3. Install:
- Brake caliper support bolt
- Pin plug
- Rear brake caliper protector



Brake caliper support bolt 17 Nm (1.7 m•kg, 12 ft•lb) Pin plug 2.5 Nm (0.25 m•kg, 1.8 ft•lb) Rear brake caliper protector 7 Nm (0.7 m•kg, 5.1 ft•lb)

- Check:
  - Brake fluid level
    Below the minimum level mark "a" → Add the
    recommended brake fluid to the proper level.
    Refer to "CHECKING THE BRAKE FLUID
    LEVEL" on page 1-23.



- 5. Check:
  - Brake pedal operation

Soft or spongy feeling  $\rightarrow$  Bleed the brake system.

Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 1-25.

EAS22590

# REMOVING THE REAR BRAKE CALIPER

NOTE:

Before disassembling the brake caliper, drain the brake fluid from the entire brake system.

- 1. Remove:
  - Union bolt
  - Copper washers
  - Brake hose

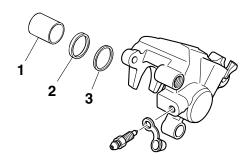
NOTE:

Put the end of the brake hose into a container and pump out the brake fluid carefully.

FAS22600

# DISASSEMBLING THE REAR BRAKE CALIPER

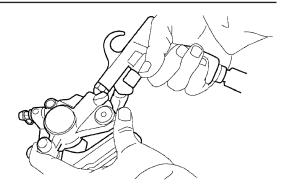
- 1. Remove:
- Brake caliper piston "1"
- Brake caliper dust seals "2"
- Brake caliper piston seals "3"



 a. Blow compressed air into the brake hose joint opening to force out the piston from the brake caliper. EWA13550

## **WARNING**

- Cover the brake caliper piston with a rag.
   Be careful not to get injured when the piston is expelled from the brake caliper.
- Never try to pry out the brake caliper piston.



b. Remove the brake caliper dust seals brake caliper piston seals.

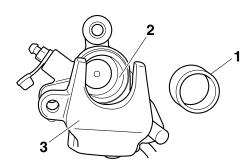


### **CHECKING THE REAR BRAKE CALIPER**

\_\_\_\_\_

| Recommended brake component replacement schedule |  |  |  |
|--|--|--|--|
| Brake pads                                       | If necessary   |  |  |
| Piston seals                                     | Every two years  |  |  |
| Brake hoses                                      | Every four years                                       |  |  |
| Brake fluid                                      | Every two years and whenever the brake is disassembled |  |  |

- 1. Check:
- Brake caliper pistons "1"
   Rust/scratches/wear → Replace the brake caliper pistons.
- Brake caliper cylinders "2" Scratches/wear → Replace the brake caliper assembly.
- Brake caliper body "3"
   Cracks/damage → Replace the brake caliper assembly.
- Brake fluid delivery passages (brake caliper body)
   Obstruction → Blow out with compressed air.



EWA13610

# **WARNING**

Whenever a brake caliper is disassembled, replace the brake caliper piston seals.

- 2. Check:
  - Brake caliper brackets
     Cracks/damage → Replace.

FAS22650

## **ASSEMBLING THE REAR BRAKE CALIPER**

EWA1362

### **WARNING**

- Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.
- Never use solvents on internal brake components as they will cause the piston seals to swell and distort.
- Whenever a brake caliper is disassembled, replace the brake caliper piston seals.



Recommended fluid DOT 4

EAS2267

#### **INSTALLING THE REAR BRAKE CALIPER**

- 1. Install:
- Rear brake caliper
- Rear brake caliper bracket
- 2. Install:
- Rear wheel Refer to "REAR WHEEL" on page 4-7.
- Brake hose
- Union bolt



Union bolt 30 Nm (30. m•kg, 22 ft•lb)

EWA13530

# **WARNING**

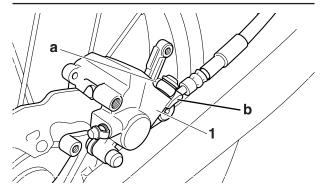
Proper brake hose routing is essential to insure safe vehicle operation. Refer to "CA-

# BLE ROUTING" on page 2-30.

ECA14170

#### **CAUTION:**

When installing the brake hose onto the brake caliper "1", make sure the brake pipe "a" touches the projection "b" on the brake caliper.



- 3. Install:
- Brake pad springs
- Brake pads
- Brake caliper support bolt
- Pin plug Refer to "REPLACING THE REAR BRAKE PADS" on page 4-28.



Brake caliper support bolt 17 Nm (1.7 m•kg, 12 ft•lb)

- 4. Fill:
  - Brake fluid reservoir (with the specified amount of the recommended brake fluid)



Recommended fluid DOT 4

EWA13090

# **WARNING**

- Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.
- Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.
- When refilling, be careful that water does not enter the brake fluid reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.

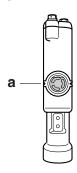
ECA13540

#### **CAUTION:**

Brake fluid may damage painted surfaces

and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

- 5. Bleed:
  - Brake system Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 1-25.
- 6. Check:
  - Brake fluid level
    Below the minimum level mark "a" → Add the
    recommended brake fluid to the proper level.
    Refer to "CHECKING THE BRAKE FLUID
    LEVEL" on page 1-23.



- 7. Check:
  - Brake pedal operation
     Soft or spongy feeling → Bleed the brake system.

Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 1-25.

FAS2270

# REMOVING THE REAR BRAKE MASTER CYLINDER

NOTE: \_

Before removing the rear brake master cylinder, drain the brake fluid from the entire brake system.

- 1. Remove:
- Union bolt
- Copper washers
- Brake hose

NOTE:

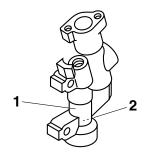
To collect any remaining brake fluid, place a container under the master cylinder and the end of the brake hose.

EAS2271

# CHECKING THE REAR BRAKE MASTER CYLINDER

- 1. Check:
- Brake master cylinder "1"
   Damage/scratches/wear → Replace.
- Brake fluid delivery passages "2" (brake master cylinder body)

Obstruction  $\rightarrow$  Blow out with compressed air.



- 2. Check:
- Brake master cylinder kit Damage/wear → Replace.
- 3. Check:
  - $\bullet \mbox{ Master cylinder reservoir cap} \\ \mbox{ Cracks/damage} \rightarrow \mbox{ Replace}.$
  - Brake master cylinder reservoir diaphragm holder
- Brake master cylinder reservoir diaphragm Cracks/damage → Replace.
- 4. Check:
- Brake hoses  ${\it Cracks/damage/wear} \to {\it Replace}.$

EAS22730

# ASSEMBLING THE REAR BRAKE MASTER CYLINDER

EWA13520

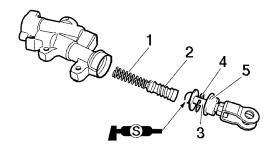
# **MARNING**

- Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.
- Never use solvents on internal brake components.



# Recommended fluid DOT 4

- 1. Install:
- Cylinder cup New
- Master cylinder piston
- 2. Install:
  - Spring "1" New
  - Master cylinder piston "2" New
  - Adjusting rod "3" New
  - Circlip "4" New
  - Dust boot "5" New



EAS22750

# INSTALLING THE REAR BRAKE MASTER CYLINDER

- 1. Install:
- Copper washers New
- Brake hoses
- Union bolt



Brake hose union bolt 30 Nm (30. m•kg, 22 ft•lb)

EWA1353

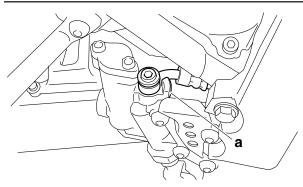
# **WARNING**

Proper brake hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" on page 2-30.

ECA32D1002

#### **CAUTION:**

When installing the brake hose onto the brake master cylinder, make sure the brake pipe touch the projection "a" as shown.



- 2. Fill:
- Brake fluid reservoir



Recommended fluid DOT 4

EWA1309

## **WARNING**

 Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.

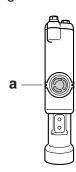
- Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.
- When refilling, be careful that water does not enter the brake fluid reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.

ECA13540

### **CAUTION:**

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

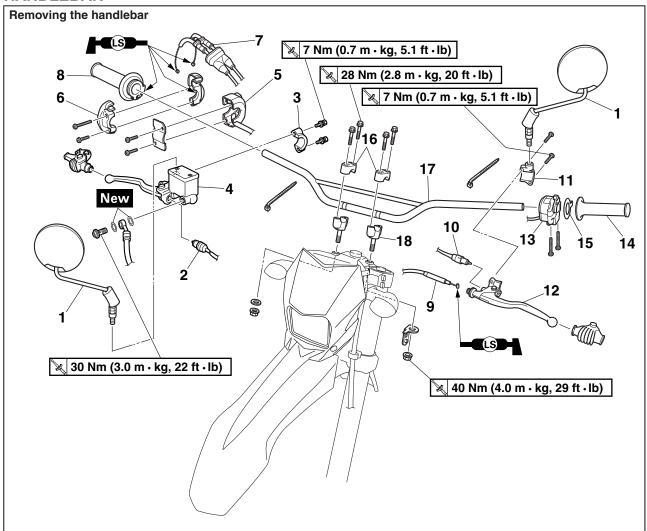
- 3. Bleed:
- Brake system
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 1-25.
- 4. Check:
  - Brake fluid level
    Below the minimum level mark "a" → Add the
    recommended brake fluid to the proper level.
    Refer to "CHECKING THE BRAKE FLUID
    LEVEL" on page 1-23.



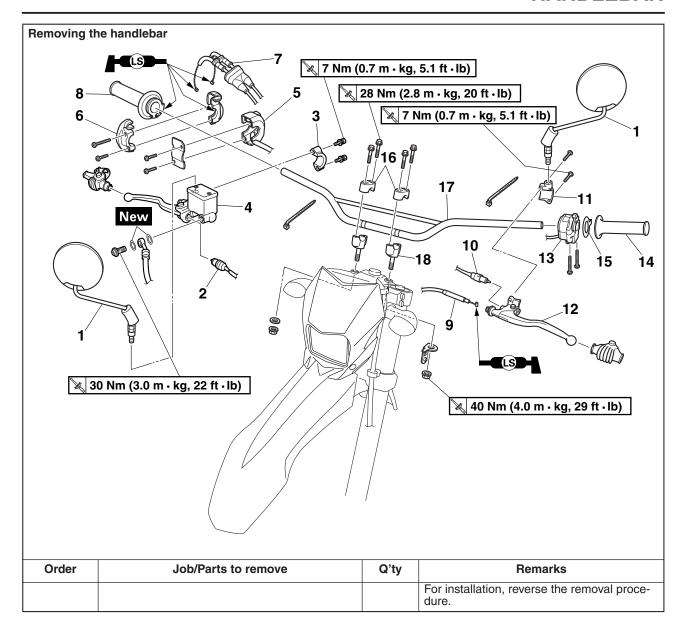
- 5. Check:
  - Brake pedal operation
     Soft or spongy feeling → Bleed the brake system.

Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 1-25.

# **HANDLEBAR**



| Order | Job/Parts to remove                  | Q'ty | Remarks |
|-------|--------------------------------------|------|---------|
| 1     | Rear view mirror (left/right)        | 1/1  |         |
| 2     | Front brake light switch             | 1    |         |
| 3     | Front brake master cylinder holder   | 1    |         |
| 4     | Front brake master cylinder assembly | 1    |         |
| 5     | Right handlebar switch               | 1    |         |
| 6     | Throttle cable housing               | 1    |         |
| 7     | Throttle cable                       | 2    |         |
| 8     | Throttle grip                        | 1    |         |
| 9     | Clutch cable                         | 1    |         |
| 10    | Clutch switch                        | 1    |         |
| 11    | Clutch lever holder                  | 1    |         |
| 12    | Clutch lever                         | 1    |         |
| 13    | Left handlebar switch                | 1    |         |
| 14    | Handlebar grip                       | 1    |         |
| 15    | Special washer                       | 1    |         |
| 16    | Handlebar upper holder               | 2    |         |
| 17    | Handlebar                            | 1    |         |
| 18    | Handlebar lower holder               | 2    |         |



#### REMOVING THE HANDLEBARS

1. Stand the vehicle on a level surface.

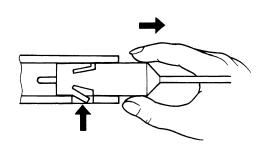
EWA13120

## **⚠** WARNING

Securely support the vehicle so that there is no danger of it falling over.

## 2. Remove:

- Front brake switch
- Clutch switch



#### NOTE:

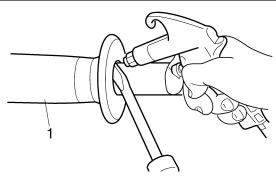
Press the projection, and remove them from front brake master cylinder assembly and clutch lever assembly.

## 3. Remove:

• Handlebar grip "1"

## NOTE:

Blow compressed air between the left handlebar and the handlebar grip, and gradually push the grip off the handlebar.



EAS22880

## **CHECKING THE HANDLEBAR**

- 1. Check:
- $\bullet$  Handlebar Bends/cracks/damage  $\rightarrow$  Replace.

EWA13690

## **⚠** WARNING

Do not attempt to straighten a bent handlebar as this may dangerously weaken it. EAS22921

## **INSTALLING THE HANDLEBAR**

1. Stand the vehicle on a level surface.

## WA13120

**MARNING** 

Securely support the vehicle so that there is no danger of it falling over.

## 2. Install:

- Handlebar "1"
- Upper handlebar holders "2"



Upper handlebar holder bolt 28 Nm (2.8 m•kg, 20 ft•lb)

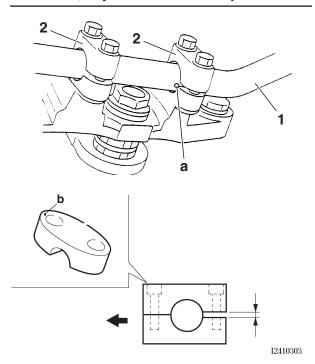
#### NOTE:

- Align the punch marks "a" on the handlebar with the upper surface of the lower handlebar holders.
- The upper handlebar holders should be installed with the punch marks "b" facing forward.

FCA14250

## **CAUTION:**

- First, tighten the bolts on the front side of the handlebar holder, and then on the rear side.
- Turn the handlebar all the way to the left and right. If there is any contact with the fuel tank, adjust the handlebar position.



- 3. Install:
  - Special washer
- Handle grip

- a. Slightly coat the handlebar left end with a rubber adhesive.
- Install the handlebar grip on the handlebar by pressing the grip from the left side.
- Wipe off any excess rubber adhesive with a clean rag.

EWA32D1005

## **WARNING**

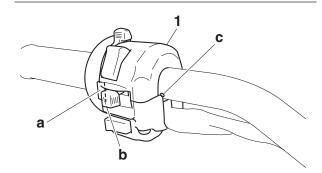
Do not touch and move the handlebar grip until its adhesive dries completely.

## 

- 4. Install:
- Left handlebar switch "1"

NOTE

- Align tab "a" of special washer with slot "b" of left handlebar switch.
- Align the mating surfaces of the left handlebar switch with the punch mark "c" on the handlebar.

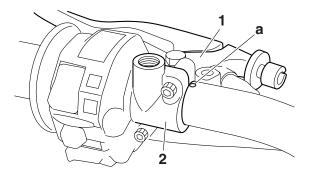


## 5. Install:

- Clutch lever holder "1"
- Clutch lever "2"

NOTE:

Align the mating surfaces of the brake lever holder with the punch mark "a" on the handlebar.

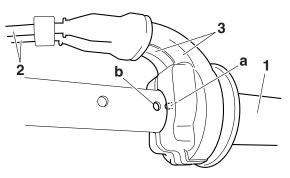


## 6. Install:

- Throttle grip "1"
- Throttle cable housing "2"
- Throttle cables "3"

#### NOTE: \_

- Align projection "a" of slot cable housing with hole "b" of the handlebar.
- Slightly coat the end of slot cable and inside of throttle grip with lithium-soap-based grease.
   Then, mount the throttle grip onto the handlebar.

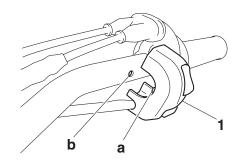


## 7. Install:

• Right handlebar switch "1"

## NOTE:

Align projection "a" of the right handlebar switch with hole "b" of the handlebar.



## 8. Install:

- Front master cylinder assembly "1"
- Front brake master cylinder holder "2"

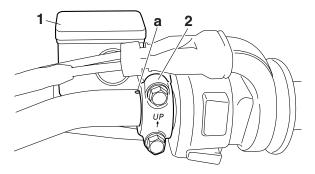


Front brake master cylinder holder bolt

7 Nm (0.7 m•kg, 5.1 ft•lb)

#### NOTE:

- Install the front brake master cylinder on the front brake master cylinder assembly by facing the cylinder " "UP" mark upward.
- Align the matching surface of front brake master cylinder holder with mark "a" of handlebar.
- Tighten the upper bolt first, and then tighten the lower bolt.



## 9. Adjust:

 Clutch cable free play Refer to "ADJUSTING THE CLUTCH CA-BLE FREE PLAY" on page 1-14.



Clutch lever free play 10.0–15.0 mm (0.39–0.59 in)

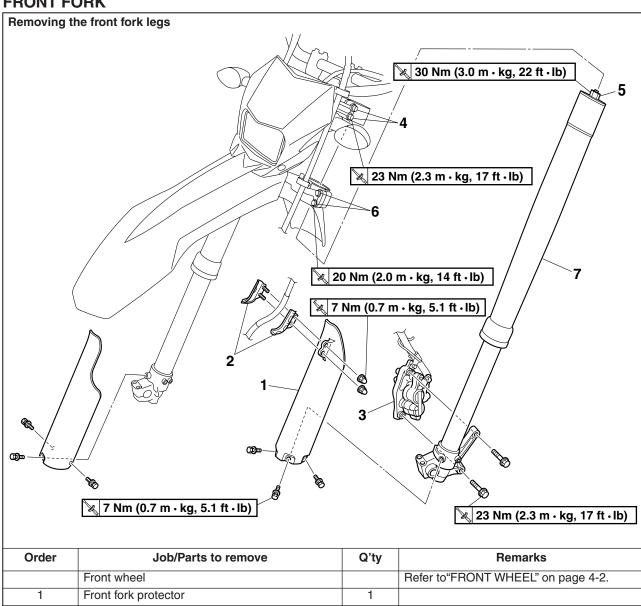
## 10.Adjust:

 Throttle cable free play Refer to "ADJUSTING THE THROTTLE CA-BLE FREE PLAY" on page 1-8.

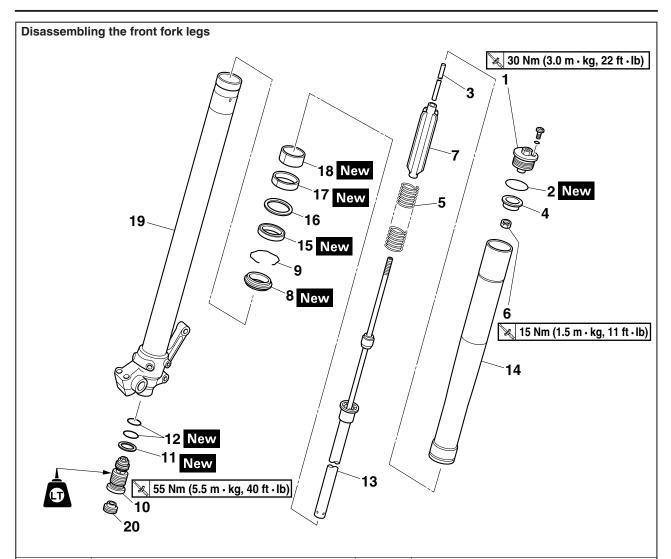


Throttle cable free play 3.0–5.0 mm (0.12–0.20 in)

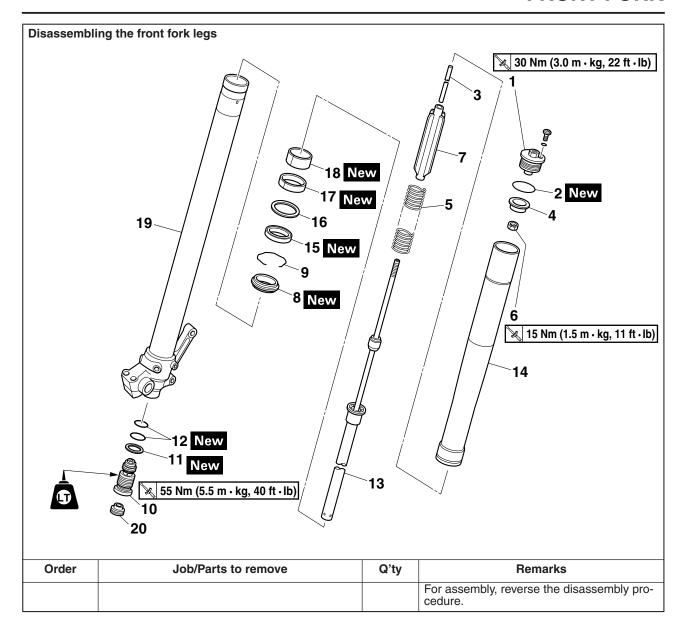
## **FRONT FORK**



| Order | Job/Parts to remove      | Q'ty | Remarks  |
|-------|--------------------------|------|--|
|       | Front wheel              |      | Refer to "FRONT WHEEL" on page 4-2.              |
| 1     | Front fork protector     | 1    |  |
| 2     | Brake hose holder        | 2    |  |
| 3     | Front brake caliper      | 1    |  |
| 4     | Upper bracket pinch bolt | 2    | Loosen.  |
| 5     | Front fork cap bolt      | 1    | Loosen.  |
| 6     | Lower bracket pinch bolt | 2    | Loosen.  |
| 7     | Front fork               | 1    |  |
|       |                          |      | For installation, reverse the removal procedure. |



| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------|------|---------|
| 1     | Front fork cap bolt | 1    |         |
| 2     | O-ring              | 1    |         |
| 3     | Rod                 | 1    |         |
| 4     | Spring seat         | 1    |         |
| 5     | Fork spring         | 1    |         |
| 6     | Nut                 | 1    |         |
| 7     | Spring guide        | 1    |         |
| 8     | Dust seal           | 1    |         |
| 9     | Stopper ring        | 1    |         |
| 10    | Base valve          | 1    |         |
| 11    | Copper washer       | 1    |         |
| 12    | O-ring              | 2    |         |
| 13    | Damper rod          | 1    |         |
| 14    | Outer tube          | 1    |         |
| 15    | Oil seal            | 1    |         |
| 16    | Oil sealWasher      | 1    |         |
| 17    | Slide metal         | 1    |         |
| 18    | Piston metal        | 1    |         |
| 19    | Inner tube          | 1    |         |
| 20    | Rubber cap          | 1    |         |



## REMOVING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

1. Stand the vehicle on a level surface.

EWA13120

## **MARNING**

Securely support the vehicle so that there is no danger of it falling over.

## NOTE:

- Place the vehicle on a suitable stand so that the front wheel is elevated.
- Record the adjusting screw setting position before loosening the cap bolt.

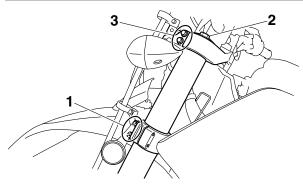
#### 2. Loosen:

- Upper bracket pinch bolts "1"
- Front fork cap bolt "2"
- Lower bracket pinch bolts "3"

EWA13640

## **MARNING**

Before loosening the upper and lower bracket pinch bolts, support the front fork leg.



## 3. Remove:

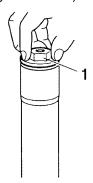
• Front fork leg

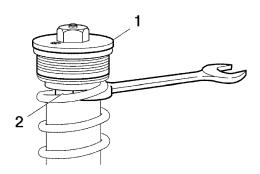
EAS22980

## DISASSEMBLING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

- 1. Remove:
- Cap bolt "1" (from outer tube) (by loosening the nut "2")





## 2. Remove:

- Nut
- Spring guide
- Push rod
- Front fork spring
- Spring guide
- 3. Drain:
  - Fork oil

#### NOTE:

Drain the fork oil by stroking the inner tube several times.

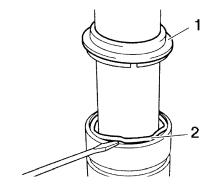
## 4. Remove:

- Dust seal "1"
- Stopper ring "2" (with a flat-head screwdriver)

ECA14180

## **CAUTION:**

Do not scratch the inner tube.



## 5. Remove:

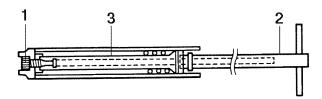
- Base valve "1"
- Copper washer
- Damper rod

## NOTE:

While holding the damper rod assembly "3" with the damper rod holder "2", loosen the damper rod assembly bolt.



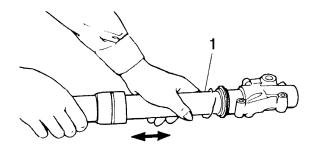
Damper rod holder 90890-01454



- 6. Remove:
  - Inner tube "1"

# a. Hold the front fork leg horizontally.

- b. Securely clamp the brake caliper bracket in a vise with soft jaws.
- Separate the inner tube from the outer tube by pulling the inner tube forcefully but carefully.



EAS23010

## CHECKING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

- 1. Check:
- Inner tube
- Outer tube
   Bends/damage/scratches → Replace.

EWA13650

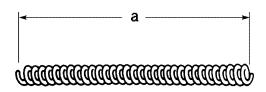
## **WARNING**

Do not attempt to straighten a bent inner tube as this may dangerously weaken it.

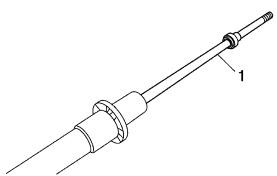
- 2. Measure:
  - Spring free length "a"
     Out of specification → Replace.



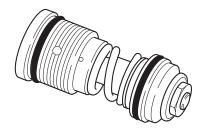
Fork spring free length 450.0 mm (17.72 in) Limit 441.0 mm (17.36 in)



- 3. Check:
  - Damper rod "1"
     Damage/wear → Replace.
     Obstruction → Blow out all of the oil passages with compressed air.



- 4. Check:
  - Base valve
     Damage/wear → Replace.
     Obstruction → Blow out all of the oil passages with compressed air.



- 5. Check:
  - Push rod Bends/damage/wear → Replace.
- 6. Check:
  - Cap bolt Damage/wear → Replace.

FAS23020

## ASSEMBLING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

EWA13660

## **WARNING**

- Make sure the oil levels in both front fork legs are equal.
- Uneven oil levels can result in poor handling and a loss of stability.

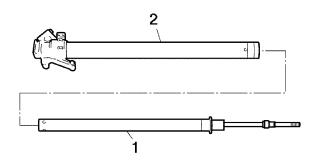
#### NOTE:

- When assembling the front fork leg, be sure to replace the following parts:
  - Piston metal
  - Slide metal
  - Oil seal
  - Dust seal
- Before assembling the front fork leg, make sure all of the components are clean.
- 1. Install:
- Damper rod "1"
- Inner tube "2"

ECA14210

## **CAUTION:**

Allow the damper rod assembly to slide slowly down the inner tube until it protrudes from the bottom of the inner tube. Be careful not to damage the inner tube.

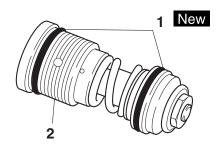


- 2. Lubricate:
  - Inner tube's outer surface



Recommended oil Suspension oil 01

- 3. Install:
- O-ring "1" New
- Copper washer New
- Base valve "2"



- 4. Tighten:
  - Base valve "1"



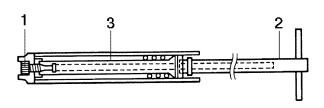
Base valve 55 Nm (5.5 m•kg, 40 ft•lb) LOCTITE®

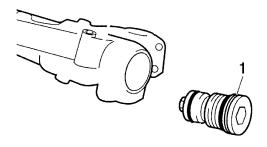
## NOTE:

While holding the damper rod assembly "3" with the damper rod holder "2", tighten the base valve.



Damper rod holder 90890-01454





- 5. Install:
  - Dust seal "1"
  - Stopper ring "2"
  - Oil seal "3" New
  - Oil seal washer "4"
  - Slide metal "5" New (on to the inner tube "6")



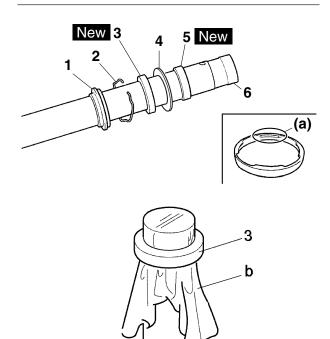
ECA32D1008

## **CAUTION:**

Face stamp "a" of the oil seal toward the front caliper mount during assembling.

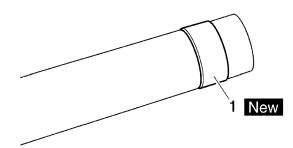
## NOTE:

- Before installing the oil seal, lubricate its lips with lithium soap base grease.
- Lubricate the outer surface of the inner tube with fork oil.
- To protect the oil seal, cover it using polyethylene bag "b", and mount the oil seal.



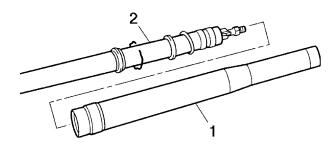
## 6. Install:

Piston metal "1" New (on the inner tube)



## 7. Install:

Outer tube "1" (on the inner tube "2")

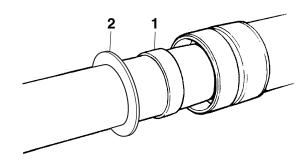


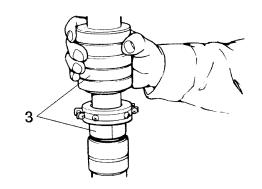
## 8. Install:

- Slide metal "1"
- Oil washer "2"
   (on the outer tube, using fork seal driver "3")



Fork seal driver 90890-01442 Adjstable fork seal driver (36–46 mm) YM-01442





## 9. Install:

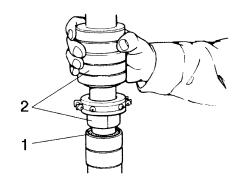
• Oil seal "1"

Using fork seal driver "2", hammer the seal until you see the stopper ring slot of outer tube.



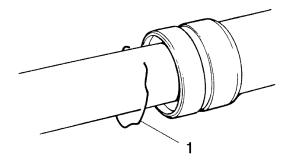
Fork seal driver 90890-01442 Adjstable fork seal driver (36–46 mm) YM-01442

12311310



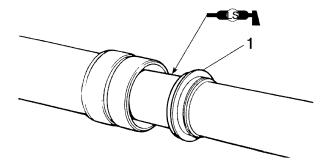
## 10.Install:

Stopper ring "1" (in the slot of outer tube)



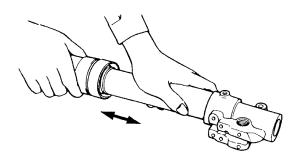
## 11.Install:

 Dust seal "1" (Slightly apply grease to the inner tube.)



## 12.Check:

Inner tube for sliding
 Unsmooth sliding → Disassemble and check.



## 13.Lubricate:

Front fork



Recommended oil Suspension oil 01

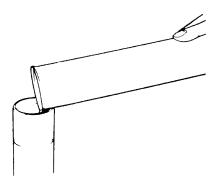


Quantity 613.0 cm<sup>3</sup> (20.73 US oz) (21.62 Imp.oz)

ECA14230

## **CAUTION:**

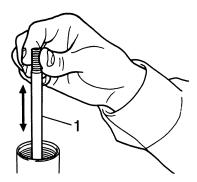
- Be sure to use the recommended fork oil.
   Other oils may have an adverse effect on front fork performance.
- When disassembling and assembling the front fork leg, do not allow any foreign material to enter the front fork.



14. When the front fork is filled with oil, slowly move dumper rod "1" up and down (at least 10 times) for lubrication of fork.

NOTE:

Move dumper rod slowly not to leak the fork oil.



15. Slowly move the inner tube up and down for lubrication again. (1 stroke = Approx. 250 mm)

NOTE:

Do not move more than 250 mm as it causes an air insertion.

16. Wait for 10 minutes to sediment and deaer-

ate the oil, then measure the fork oil level.

ECA32D1010

## **CAUTION:**

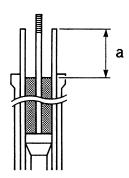
Add the suspension oil to the top level of inner tube and deaerate the oil. If the oil is below this level, each part is not lubricated and you cannot get the desired spring performance.

## 17.Measure:

Front fork oil level "a" (at highest pressure)
 Out of specification → Adjust.

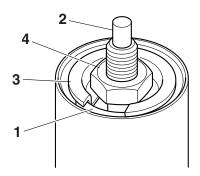


Oil level 105 mm (4.13 in)



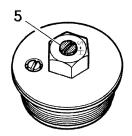
## 18.Install:

- Fork spring "1"
- Push rod" 2"
- Spring guide "3"
- Nut "4"
- Cap bolt
- a. Install the nut "3" with a finger until it is stopped.



b. Set adjusting screw "5" to the position before disassembling.

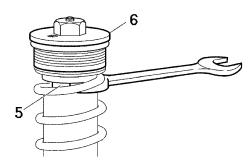
Refer to "ADJUSTING THE FRONT FORK LEGS" on page 1-28.



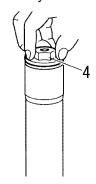
c. Tighten cap bolt "5" until it reaches nut "6" using your fingers.



Nut 15 Nm (1.5 m•kg, 11 ft•lb)



d. Install the cap bolt on the outer tube, and tighten it temporarily.



EAS2305

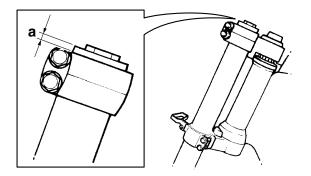
## INSTALLING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

- 1. Install:
- Front fork leg
   Temporarily tighten the upper and lower bracket pinch bolts.

NOTE:

Install the front fork so that difference "a" between the cap bolt top face and upper bracket top face becomes 3 mm, and tighten it temporarily.



- 2. Tighten:
  - Lower bracket pinch bolt "1"



Lower bracket pinch bolt 20 Nm (2.0 m•kg, 14 ft•lb)

- 3. Tighten:
  - Cap bolt "2"



Cap bolt 30 Nm (30. m•kg, 22 ft•lb)

- 4. Tighten:
  - Upper bracket pinch bolt "3"



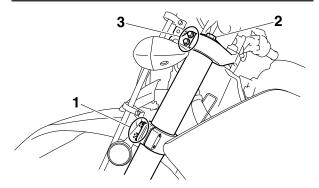
Upper bracket pinch bolt 23 Nm (2.3 m•kg, 17 ft•lb)

EWA32D1003

## **WARNING**

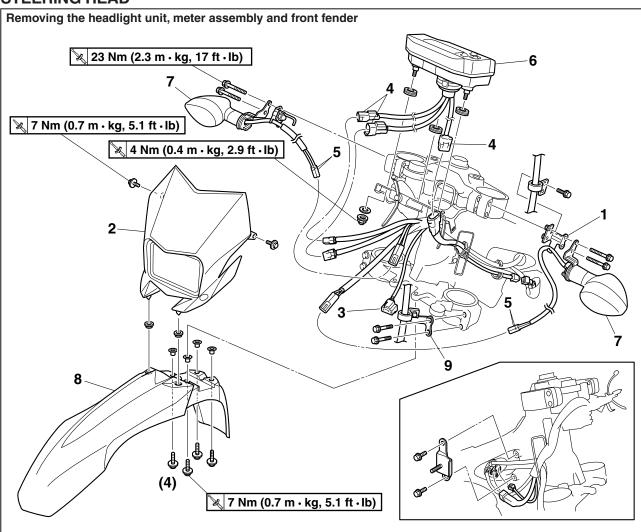
Check to see that the brake hose is installed correctly.

Refer to "CABLE ROUTING" on page 2-30.

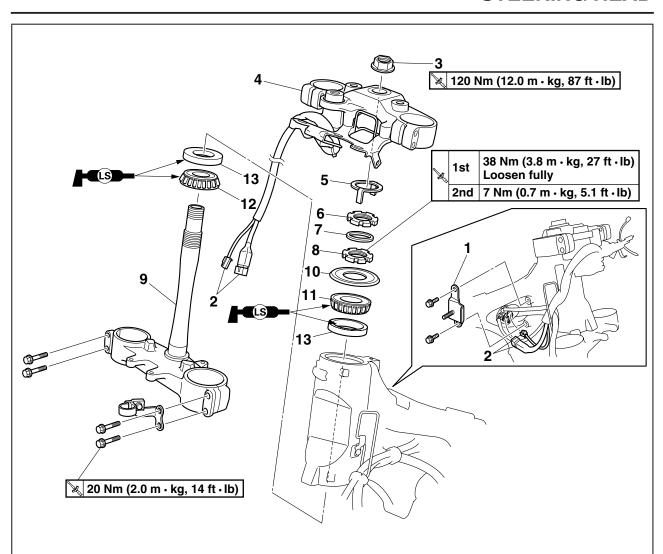


- 5. Adjust:
  - Rebound damping
- Compression damping Refer to "ADJUSTING THE FRONT FORK LEGS" on page 1-28.

## STEERING HEAD



| Order | Job/Parts to remove                            | Q'ty | Remarks  |
|-------|--|------|--|
|       | Fuel tank                                      |      | Refer to "FUEL TANK" on page 7-1.                |
|       | Handlebar                                      |      | Refer to "HANDLEBAR" on page 4-34.               |
|       | Front fork                                     |      | Refer to "FRONT FORK" on page 4-39.              |
| 1     | Brake hose guide                               | 1    |  |
| 2     | Headlight assembly                             | 1    |  |
| 3     | Headlight coupler                              | 1    | Disconnect.                                      |
| 4     | Meter assembly coupler                         | 3    | Disconnect.                                      |
| 5     | Front turn signal light connector (left/right) | 2/2  | Disconnect.                                      |
| 6     | Meter assembly                                 | 1    |  |
| 7     | Turn signal light (left/right)                 | 1/1  |  |
| 8     | Front fender                                   | 1    |  |
| 9     | Brake hose guide                               | 1    |  |
|       |  |      | For installation, reverse the removal procedure. |



| Order | Job/Parts to remove                          | Q'ty | Remarks  |
|-------|--|------|--|
|       | Headlight unit/Meter assemblies/Front fender |      | Refer to "STEERING HEAD" on page 4-49.           |
| 1     | Bracket                                      | 1    |  |
| 2     | Main switch coupler                          | 2    | Disconnect.                                      |
| 3     | Steering stem nut                            | 1    |  |
| 4     | Upper bracket                                | 1    |  |
| 5     | Special washer                               | 1    |  |
| 6     | Upper ring nut                               | 1    |  |
| 7     | Rubber washer                                | 1    |  |
| 8     | Lower ring nut                               | 1    |  |
| 9     | Lower bracket                                | 1    |  |
| 10    | Bearing cover                                | 1    |  |
| 11    | Upper bearing                                | 1    |  |
| 12    | Lower bearing                                | 1    |  |
| 13    | Bearing races                                | 2    |  |
|       |  |      | For installation, reverse the removal procedure. |

## REMOVING THE LOWER BRACKET

1. Stand the vehicle on a level surface.

EWA13120

## **MARNING**

Securely support the vehicle so that there is no danger of it falling over.

- 2. Remove:
  - Upper ring nut
  - Lower ring nut "1"

#### NOTE:

Hold the lower ring nut with the exhaust and steering nut wrench, and then remove the upper ring nut with the ring nut wrench.

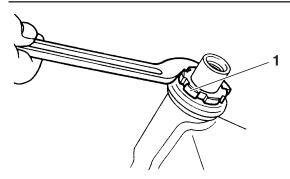


Ring nut wrench 90890-01268 Spanner wrench YU-01268

EWA13730

## **WARNING**

Securely support the lower bracket so that there is no danger of it falling.



EAS23120

## **CHECKING THE STEERING HEAD**

- 1. Wash:
- Bearings
- Bearing races



Recommended cleaning solvent Kerosene

- 2. Check:
  - Bearings
  - Bearing races
     Damage/pitting → Replace.
- 3. Replace:
  - Bearings
  - Bearing races
- a. Remove the bearing races from the steering head pipe with a long rod "1" and hammer.
- b. Remove the bearing race from the lower

bracket with a floor chisel "2" and hammer.

c. Install a new bearing races.

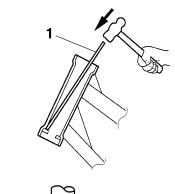
FCA14270

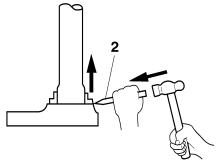
## **CAUTION:**

If the bearing race is not installed properly, the steering head pipe could be damaged.

#### NOTE:

Always replace the bearings and bearing races as a set.





- 4. Check:
- Upper bracket
- Lower bracket

   (along with the steering stem)
   Bends/cracks/damage → Replace.

EAS23140

#### **INSTALLING THE STEERING HEAD**

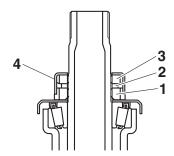
- 1. Lubricate:
  - Upper bearing
  - Lower bearing
- Bearing races



Recommended lubricant Lithium-soap-based grease

- 2. Install:
  - Lower bracket
- Lower ring nut "1"
- Rubber washer "2"
- Upper ring nut "3"
- Special washer "4"

Refer to "CHECKING AND ADJUSTING THE STEERING HEAD" on page 1-27.



- 3. Install:
- Upper bracket
- Steering stem nut

## NOTE:

Temporarily tighten the steering stem nut.

- 4. Install:
- Front fork legs Refer to "FRONT FORK" on page 4-39.

#### NOTE:

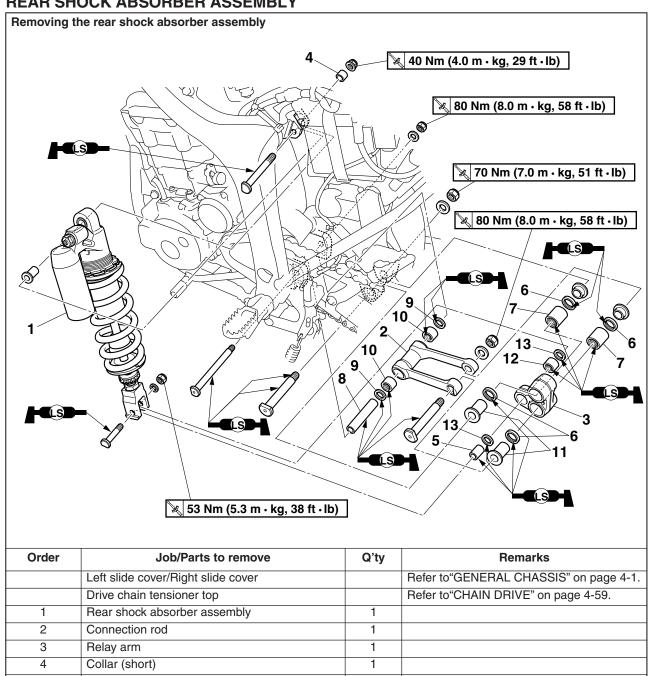
Temporarily tighten the upper and lower bracket pinch bolts.

- 5. Tighten:
  - Steering stem nut



Steering stem nut 120 Nm (12.0 m•kg, 87 ft•lb)

## REAR SHOCK ABSORBER ASSEMBLY



| Order | Job/Parts to remove                | Q'ty | Remarks  |
|-------|------------------------------------|------|--|
|       | Left slide cover/Right slide cover |      | Refer to "GENERAL CHASSIS" on page 4-1.          |
|       | Drive chain tensioner top          |      | Refer to "CHAIN DRIVE" on page 4-59.             |
| 1     | Rear shock absorber assembly       | 1    |  |
| 2     | Connection rod                     | 1    |  |
| 3     | Relay arm                          | 1    |  |
| 4     | Collar (short)                     | 1    |  |
| 5     | Collar (long)                      | 1    |  |
| 6     | Oil seal                           | 4    |  |
| 7     | Bearing                            | 2    |  |
| 8     | Collar                             | 1    |  |
| 9     | Oil seal                           | 2    |  |
| 10    | Bearing                            | 2    |  |
| 11    | Collar                             | 1    |  |
| 12    | Bearing                            | 1    |  |
| 13    | Oil seal                           | 2    |  |
|       |                                    |      | For installation, reverse the removal procedure. |

## HANDLING THE REAR SHOCK ABSORBER

EWA13740

## **↑** WARNING

This rear shock absorber contains highly compressed nitrogen gas. Before handling the rear shock absorber, read and make sure you understand the following information. The manufacturer cannot be held responsible for property damage or personal injury that may result from improper handling of the rear shock absorber.

- Do not tamper or attempt to open the rear shock absorber.
- Do not subject the rear shock absorber to an open flame or any other source of high heat. High heat can cause an explosion due to excessive gas pressure.
- Do not deform or damage the rear shock absorber in any way. Rear shock absorber damage will result in poor damping performance.

EAS23190

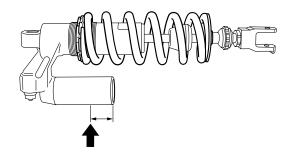
## **DISPOSING OF A REAR SHOCK ABSORBER**

Gas pressure must be released before disposing of a rear shock absorber. To release the gas pressure, drill a 2–3-mm hole through the rear shock absorber at a point 30–35 mm from its end as shown.

EWA13760

## **WARNING**

Wear eye protection to prevent eye damage from released gas or metal chips.



EAS23230

# REMOVING THE REAR SHOCK ABSORBER ASSEMBLY

1. Stand the vehicle on a level surface.

EWA13120

## **WARNING**

Securely support the vehicle so that there is no danger of it falling over.

#### NOTE:

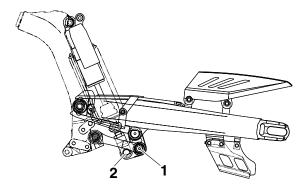
Place the vehicle on a suitable stand so that the rear wheel is elevated.

#### 2. Remove:

- Connecting arm bolt "1"
- Rear shock absorber assembly lower bolt "2"

#### NOTE:

While removing the rear shock absorber assembly lower bolt, hold the swingarm so that it does not drop down.



- 3. Remove:
  - Rear shock absorber assembly upper bolt
  - Rear shock absorber assembly

#### NOTE:

Raise the swingarm and then remove the rear shock absorber assembly from between the swingarm and relay arm.

EAS2324

# CHECKING THE REAR SHOCK ABSORBER ASSEMBLY

- 1. Check:
- Rear shock absorber rod
   Bends/damage → Replace the rear shock
   absorber assembly.
- Rear shock absorber
   Gas leaks/oil leaks → Replace the rear shock absorber assembly.
- Spring
   Damage/wear → Replace the rear shock absorber assembly.
- Bushings
   Damage/wear → Replace.
- ullet Bolts Bends/damage/wear ullet Replace.

FAS2326

# CHECKING THE CONNECTING ARM AND RELAY ARM

- 1. Check:
- Connecting rod
- Relay arm

## REAR SHOCK ABSORBER ASSEMBLY

Damage/wear  $\rightarrow$  Replace.

- 2. Check:
  - Bearings
  - Oil seals

Damage/pitting  $\rightarrow$  Replace.

- 3. Check:
  - Collar

Damage/scratches  $\rightarrow$  Replace.

FAS23270

## **INSTALLING THE RELAY ARM**

- 1. Lubricate:
- Oil seal
- Bearings
- Collar



Recommended Jubricant Lithium-soap-based grease

- 2. Install:
  - Bearing "1" (To connecting rod "2")
- Bearing "3" (To relay arm "4")
- Bearing "5" (To rear cushion lower position "6")
- Oil seal "7" (To the connecting rod, relay arm, and rear cushion lower position)



Installed depth (connecting rod bearing) "a"

5.0-5.5 mm (0.20-0.22 in) Installed depth (rear cushion lower bearing) "b"

4.0 mm (0.16 in)

Installed depth (relay arm bearing) "c"

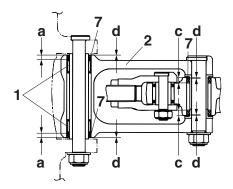
6 mm (0.24 in)

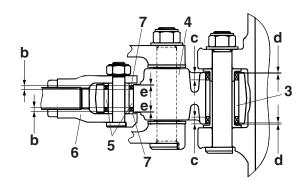
Installed depth (connecting rod oil seal, relaly arm oil seal) "d"

0-0.5 mm (0-0.02 in) Installed depth (rear cushion low-

er oil seal) "e"

0.5-1.0 mm (0.02-0.04 in)





EAS23310

## INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY

- 1. Install:
- Rear shock absorber assembly

#### NOTE:

- When installing the rear shock absorber assembly, lift up the swingarm.
- Install all bolts from the left side.
- 2. Tighten:
- Rear shock absorber assembly upper nut



Rear shock absorber assembly upper nut 40 Nm (4.0 m•kg, 29 ft•lb)

Nut (Frame and connecting rod)



Nut (Frame and connecting rod) 80 Nm (8.0 m•kg, 58 ft•lb)

Nut (Relay arm and connecting rod)



Nut (Relay arm and connecting

80 Nm (8.0 m•kg, 58 ft•lb)

Nut (Relay arm and swingarm)



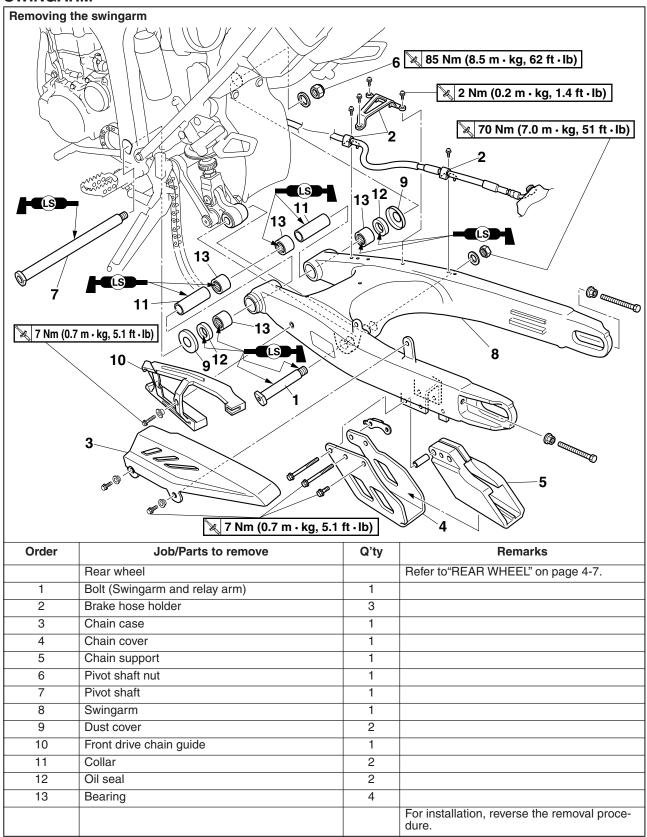
Nut (Relay arm and Swingarm) 70 Nm (7.0 m•kg, 51 ft•lb)

 Nut (Rear shock absorber assembly lower and Relay arm)



Nut (Rear shock absorber assembly lower and Relay arm) 53 Nm (5.3 m•kg, 38 ft•lb)

## **SWINGARM**



## REMOVING THE SWINGARM

1. Stand the vehicle on a level surface.

WA13120

## **MARNING**

Securely support the vehicle so that there is no danger of it falling over.

## NOTE:

Place the vehicle on a suitable stand so that the rear wheel is elevated.

- 2. Measure:
  - Swingarm side play
  - Swingarm vertical movement

a. Measure the tightening torque of the pivot shaft nut.

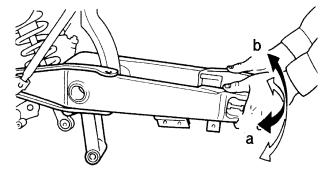


## Pivot shaft nut 85 Nm (8.5 m•kg, 62 ft•lb)

- b. Measure the swingarm side play "a" by moving the swingarm from side to side.
- c. If the swingarm side play is out of specification, check the spacers, bearings, washers, and dust covers.
- d. Check the swingarm vertical movement "b" by moving the swingarm up and down. If swingarm vertical movement is not smooth or if there is binding, check the spacers, bearings, washers, and dust covers.



Swingarm side play (at the end of the swingarm) 0 mm (0 in)



E4823366

#### CHECKING THE SWINGARM

\_\_\_\_

- 1. Check:
- $\bullet \mbox{ Swingarm} \\ \mbox{ Bends/cracks/damage} \rightarrow \mbox{ Replace}.$

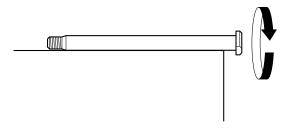
- 2. Check:
  - Pivot shaft
     Roll the pivot shaft on a flat surface.

     Bends → Replace.

EWA13770

## **№** WARNING

Do not attempt to straighten a bent pivot shaft.



- 3. Wash:
- Pivot shaft
- Dust covers
- Collar
- Washers
- Bearings



# Recommended cleaning solvent Kerosene

- 4. Check:
- Dust covers
- Collar
- Washers
- Oil seals
   Damage/wear → Replace.
- Bearings
   Damage/pitting → Replace.

EAS23380

## **INSTALLING THE SWINGARM**

- 1. Lubricate:
- Bearings
- Collar
- Dust covers
- Pivot shaft

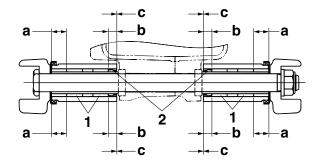


## Recommended lubricant Lithium-soap-based grease

- 2. Install:
  - Bearing "1"
  - Oil seal "2"
  - Collar (Swingarm)



Installed depth "a" 15 mm (0.59 in) Installed depth "b" 8.5–9.0 mm (0.33–0.35 in) Installed depth "c" 0–0.5 mm (0–0.02 in)



- 3. Install:
- Rear shock absorber assembly Refer to "REAR SHOCK ABSORBER AS-SEMBLY" on page 4-53.
- 4. Install:
  - Swing arm assembly



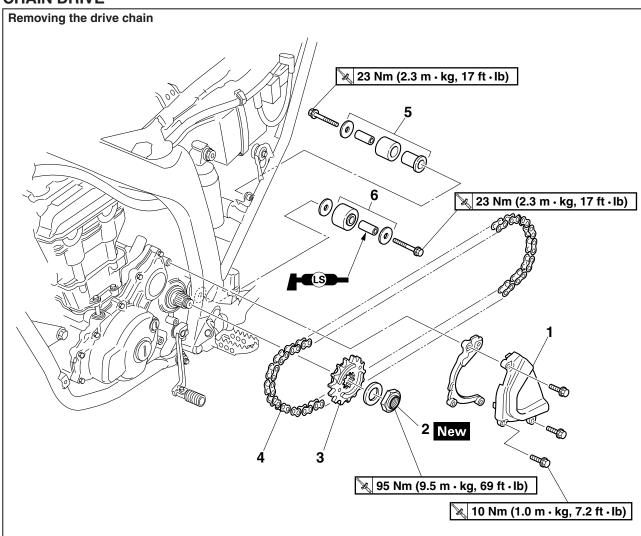
Pivot shaft nut 85 Nm (8.5 m•kg, 62 ft•lb)

- 5. Install:
  - Rear wheel Refer to "REAR WHEEL" on page 4-7.
- 6. Adjust:
  - Drive chain slack Refer to "ADJUSTING THE DRIVE CHAIN SLACK" on page 1-26.



Drive chain slack WR250R 38.0–48.0 mm (1.50–1.89 in) WR250X 40.0–50.0 mm (1.57–1.97 in)

## **CHAIN DRIVE**



| Order | Job/Parts to remove          | Q'ty | Remarks  |
|-------|------------------------------|------|--|
|       | Swingarm                     |      | Refer to "SWINGARM" on page 4-56.                |
| 1     | Drive sprocket cover         | 1    |  |
| 2     | Drive sprocket nut           | 1    |  |
| 3     | Drive sprocket               | 1    |  |
| 4     | Drive chain                  | 1    |  |
| 5     | Drive chain tensioner top    | 1    |  |
| 6     | Drive chain tensioner bottom | 1    |  |
|       |                              |      | For installation, reverse the removal procedure. |

## REMOVING THE DRIVE CHAIN

1. Stand the vehicle on a level surface.

WA13120

## **⚠** WARNING

Securely support the vehicle so that there is no danger of it falling over.

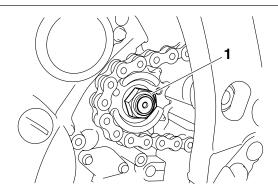
NOTE:

Place the vehicle on a suitable stand so that the rear wheel is elevated.

- 2. Remove:
  - Drive sprocket nut "1"

NOTE:

- Return the bent tab of the locknut.
- Operate the rear brake, and loosen the drive sprocket.
- After loosening the drive sprocket, remove the rear wheel and swingarm.



- 3. Remove:
  - Rear wheel

Refer to "REAR WHEEL" on page 4-7.

- Rear shock absorber
   Refer to "REAR SHOCK ABSORBER AS-SEMBLY" on page 4-53.
- Swingarm
   Refer to "SWINGARM" on page 4-56.
- 4. Remove:
  - Drive chain

EAS2344

## **CHECKING THE DRIVE CHAIN**

- 1. Measure:
  - 15-link section "a" of the drive chain
     Out of specification → Replace the drive chain.

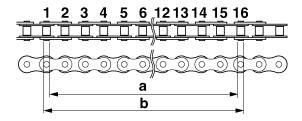


15-link length limit 239.3 mm (9.42 in)

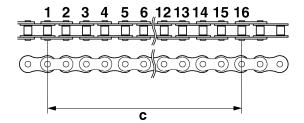
a. Measure the length "a" between the inner sides of the pins and the length "b" between the outer sides of the pins on a 15-link section

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

of the drive chain as shown in the illustration.



b. Calculate the length "c" of the 15-link section of the drive chain using the following formula.
 Drive chain 15-link section length "c" = (length "a" between pin inner sides + length "b" between pin outer sides)/2



NOTE:

- When measuring a 15-link section of the drive chain, make sure that the drive chain is taut.
- Perform this procedure 2–3 times, at a different location each time.

## 2. Check:

Drive chain
 Stiffness → Clean, lubricate, or replace.



- 3. Clean:
- Drive chain
- a. Wipe the drive chain with a clean cloth.
- b. Put the drive chain in kerosene and remove any remaining dirt.

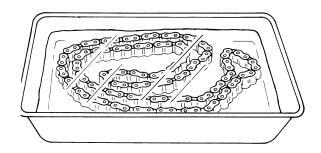
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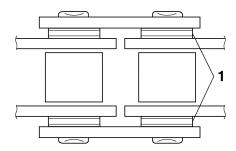
c. Remove the drive chain from the kerosene and completely dry it.

ECA14290

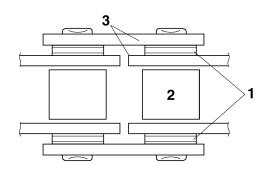
## **CAUTION:**

- This motorcycle has a drive chain with small rubber O-rings "1" between the drive chain side plates. Never use high-pressure water or air, steam, gasoline, certain solvents (e.g., benzine), or a coarse brush to clean the drive chain. High-pressure methods could force dirt or water into the drive chain's internals, and solvents will deteriorate the O-rings. A coarse brush can also damage the O-rings. Therefore, use only kerosene to clean the drive chain.
- Do not soak the drive chain in kerosene for more than ten minutes, otherwise the O-rings can be damaged.





- 4. Check:
- O-rings "1"
   Damage → Replace the drive chain.
- Drive chain rollers "2"
   Damage/wear → Replace the drive chain.
- Drive chain side plates "3"
   Damage/wear → Replace the drive chain.



- 5. Lubricate:
- Drive chain



Recommended lubricant
Engine oil or chain lubricant
suitable for O-ring chains

FAS2346

## CHECKING THE DRIVE SPROCKET

- 1. Check:
  - Drive sprocket Refer to "CHECKING AND REPLACING THE REAR WHEEL SPROCKET" on page 4-9.

EAS23470

# CHECKING THE REAR WHEEL SPROCKET Refer to "CHECKING AND REPLACING THE REAR WHEEL SPROCKET" on page 4-9.

FAS23490

## **INSTALLING THE DRIVE CHAIN**

- 1. Lubricate:
- Drive chain



Recommended lubricant
Engine oil or chain lubricant
suitable for O-ring chains

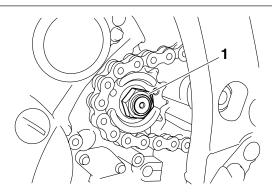
- 2. Install:
  - Drive chain
  - Drive sprocket
  - Drive sprocket nut (temporarily)
- 3. Install:
  - Swingarm
     Refer to "SWINGARM" on page 4-56.
- Rear wheel Refer to "REAR WHEEL" on page 4-7.
- 4. Tighten:
- Drive sprocket nut "1"



Drive sprocket nut 95 Nm (9.5 m•kg, 69 ft•lb)

## NOTE:

- While applying the rear brake, tighten the drive sprocket nut.
- Stake the nut "1".



## 5. Adjust:

 Drive chain slack
 Refer to "ADJUSTING THE DRIVE CHAIN SLACK" on page 1-26.



Drive chain slack WR250R 38.0–48.0 mm (1.50–1.89 in) WR250X 40.0–50.0 mm (1.57–1.97 in)

ECA13550

## **CAUTION:**

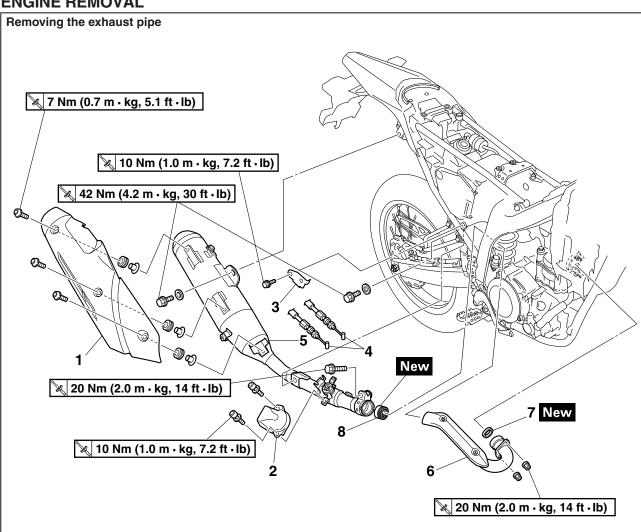
A drive chain that is too tight will overload the engine and other vital parts, and one that is too loose can skip and damage the swingarm or cause an accident. Therefore, keep the drive chain slack within the specified limits.

# **ENGINE**

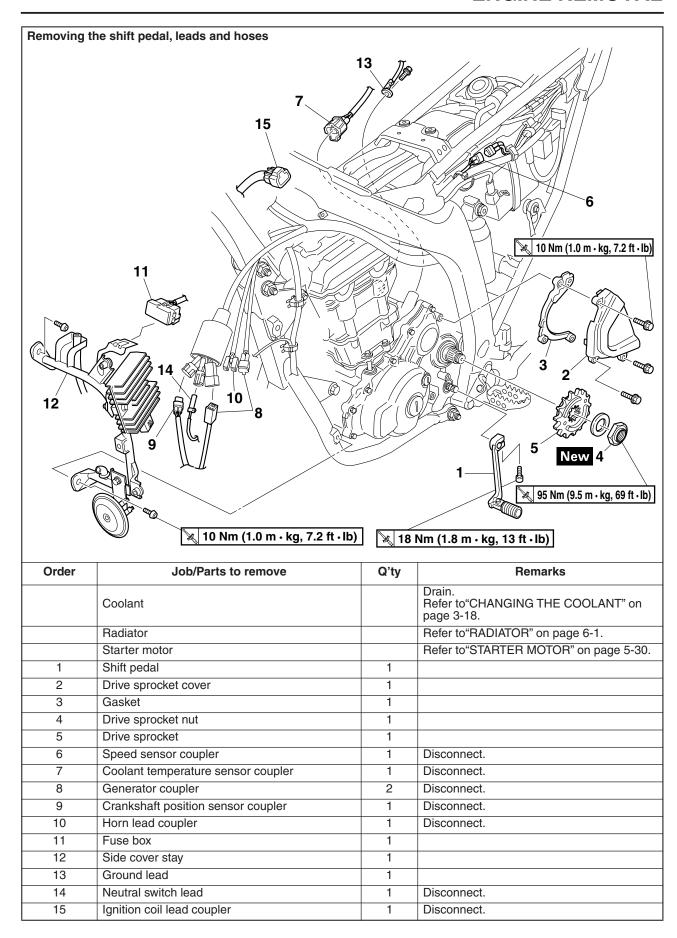
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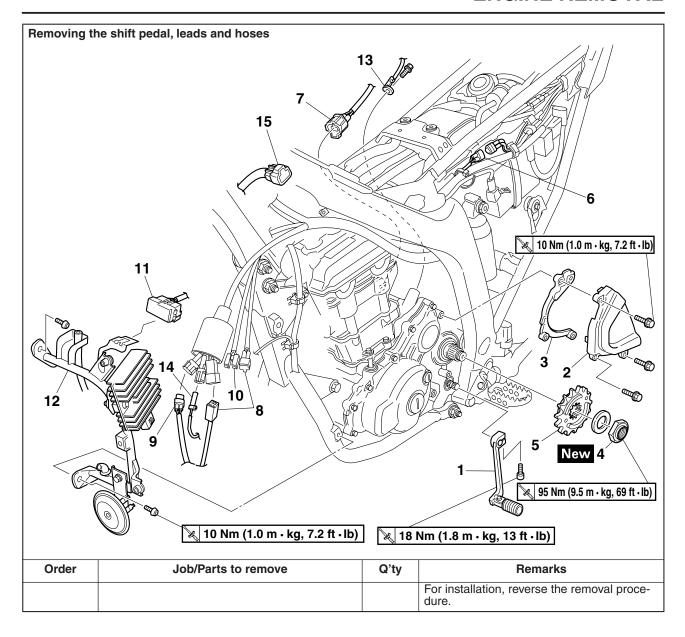
## **ENGINE REMOVAL**

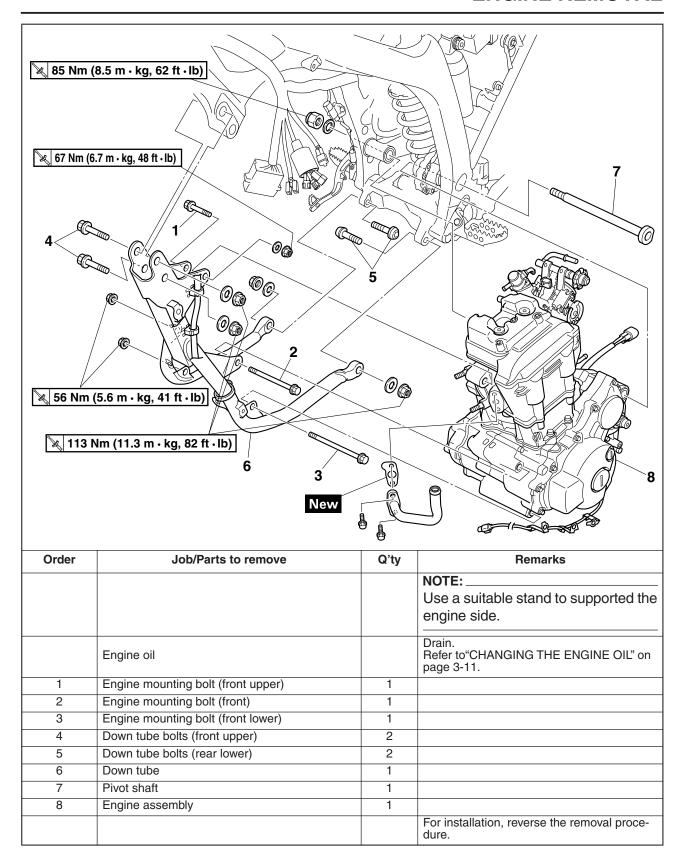


| Order | Job/Parts to remove          | Q'ty | Remarks  |
|-------|------------------------------|------|--|
|       | Seat side cover (left/right) |      | Refer to "GENERAL CHASSIS" on page 4-1.          |
|       | Air scoop (left/right)       |      | Refer to "GENERAL CHASSIS" on page 4-1.          |
| 1     | Muffler protector            | 1    |  |
| 2     | EXUP pulley cover            | 1    |  |
| 3     | Side cover right stay        | 1    |  |
| 4     | EXUP cable                   | 2    |  |
| 5     | Muffler                      | 1    |  |
| 6     | Exhaust pipe                 | 1    |  |
| 7     | Exhaust pipe gasket          | 1    |  |
| 8     | Muffler gasket               | 1    |  |
|       |                              |      | For installation, reverse the removal procedure. |



# **ENGINE REMOVAL**



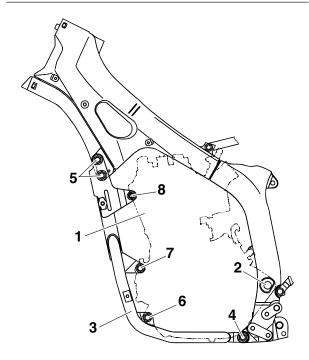


## **INSTALLING THE ENGINE**

- 1. Install:
- Engine assembly "1"
- Pivot shaft "2"
- Down tube "3"
- Down tube bolt (rear lower side) "4"
- Down tube bolt (front upper side) "5"
- Engine mounting bolt (front lower side) "6"
- Engine mounting bolt (front) "7"
- Engine mounting bolt (front upper side) "8"

#### NOTE:

Do not fully tighten the bolts. (Temporarily tighten)



## 2. Tighten:

- Pivot shaft nut
- Downtube nut (rear lower side)

Pivot shaft nut

• Engine mounting nut



85 Nm (8.5 m•kg, 62 ft•lb)
Downtube nut (rear lower side)
113 Nm (11.3 m•kg, 82 ft•lb)
Downtube nut (front upper side)
113 Nm (11.3 m•kg, 82 ft•lb)
Engine mounting nut (front lower side)
56 Nm (5.6 m•kg, 41 ft•lb)
Engine mounting nut (front upper side)
67 Nm (6.7 m•kg, 48 ft•lb)
Engine mounting nut (front)
56 Nm (5.6 m•kg, 41 ft•lb)

EAS32D1009

## **INSTALLING THE SHIFT PEDAL**

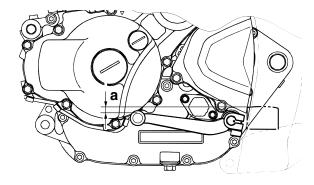
- 1. Install:
  - Shift pedal



Shift pedal bolt 18 Nm (1.8 m•kg, 13 ft•lb)

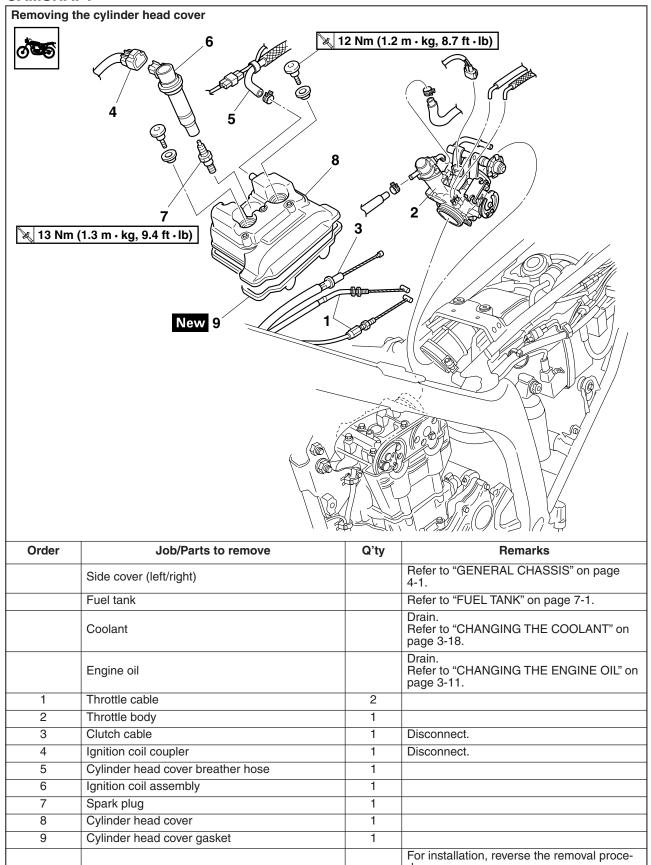
## NOTE:

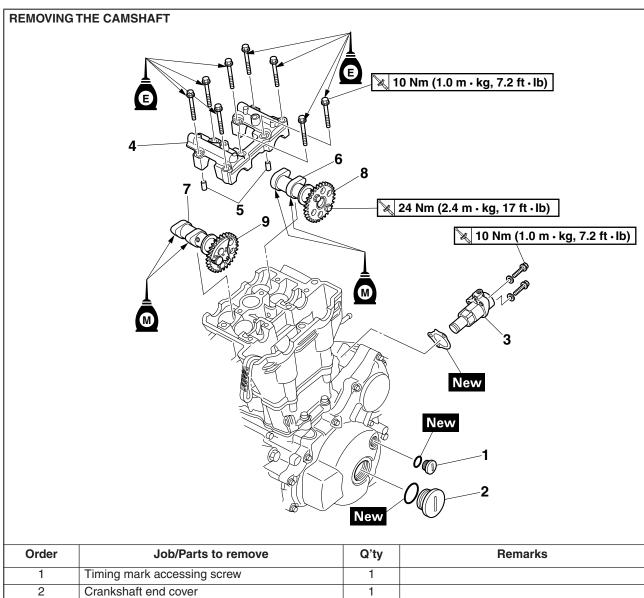
Install the shift pedal so that pedal top face "a" is 5 mm (0.20 in) lower than the footrest top face.



a. 5 mm (0.20 in)

## **CAMSHAFT**





| Order | Job/Parts to remove             | Q'ty | Remarks  |
|-------|---------------------------------|------|--|
| 1     | Timing mark accessing screw     | 1    |  |
| 2     | Crankshaft end cover            | 1    |  |
| 3     | Timing chain tensioner assembly | 1    |  |
| 4     | Camshaft cap                    | 1    |  |
| 5     | Dowel pin                       | 2    |  |
| 6     | Camshaft (IN)                   | 1    |  |
| 7     | Camshaft (EX)                   | 1    |  |
| 8     | Camshaft sprocket (IN)          | 1    |  |
| 9     | Camshaft sprocket (EX)          | 1    |  |
|       |                                 |      | For installation, reverse the removal procedure. |

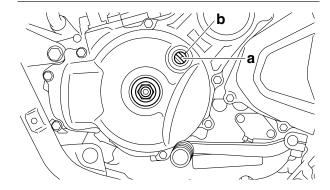
#### REMOVING THE CAMSHAFT

- 1. Remove:
- Crankshaft end cover
- Timing mark accessing screw
- 2. Align:
- TDC on the generator rotor (mark on the crankcase cover) \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

a. Turn the crankshaft counterclockwise.

b. When piston is at TDC on the compression stroke, align the mark "a" on the generator rotor with the mark "b" on the crankcase cover.

TDC on the compression stroke can be found when the camshaft lobes are turned away from each other.



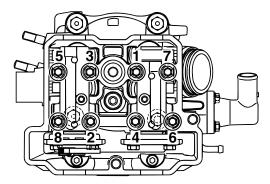
#### 3. Remove:

- Cylinder head cover
- 4. Loosen:
  - Camshaft sprocket bolt
- 5. Remove:
  - Timing chain tensioner assembly
  - Gasket
- 6. Remove:
  - · Camshaft cap bolts
  - Camshaft cap

ECA32D1006

#### **CAUTION:**

To prevent damage to the cylinder head, camshafts or camshaft caps, loosen the camshaft cap bolts in satages and in order from 1 to 8.

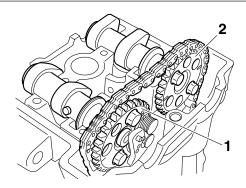


#### 7. Remove:

- Intake camshaft "1"
- Exhaust camshaft "2"

#### NOTE:

To prevent the timing chain from falling into the crankcase, fasten it with a wire to it.



#### CHECKING THE CAMSHAFT

- 1. Check:
- Camshaft lobes Blue discoloration/pitting/scratches → Replace the camshaft.
- 2. Measure:
  - Camshaft lobe dimensions "a" and "b" Out of specification  $\rightarrow$  Replace the camshaft.



Camshaft lobe dimension limit Intake A

піаке A - 37 550-37 650

34.550–34.650 mm (1.3602–1.3642 in)

Limit

35.450 mm (1.3957 in)

Intake B

25.953-26.053 mm

(1.0218–1.0257 in)

Limit

25.853 mm (1.0178 in)

**Exhaust A** 

34.850-34.950 mm

(1.3720–1.3760 in)

Limit

34.750 mm (1.3681 in)

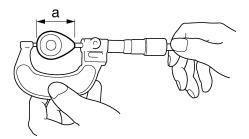
Exhaust B

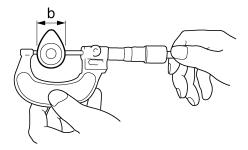
25.986-26.086 mm

(1.0231–1.0270 in)

Limit

25.886 mm (1.0191 in)

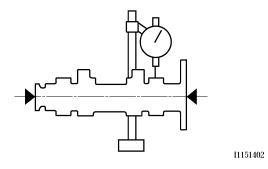




- 3. Measure:
  - Camshaft runout
     Out of specification → Replace.



Camshaft runout limit 0.015 mm (0.00059 in) or less



#### 4. Measure:

 Camshaft-journal-to-camshaft-cap clearance Out of specification → Measure the camshaft journal diameter.



Camshaft-journal-to-camshaft-cap clearance

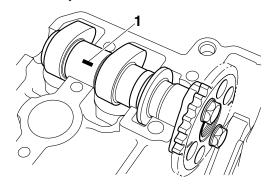
0.028-0.062 mm (0.0011-0.0024

in)

Limit

0.08 mm (0.0031 in)

- a. Install the camshaft into the cylinder head (without the dowel pins and camshaft caps).
- b. Position a strip of Plastigauge® "1" onto the camshaft journal as shown.



c. Install the dowel pins and camshaft caps.

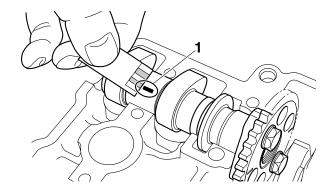
#### NOTE:

- Tighten the camshaft cap bolts in the order of the embossed numbers on the camshaft cap.
- Do not turn the camshaft when measuring the camshaft journal-to-camshaft cap clearance.



Camshaft cap bolts 10 Nm (1.0 m•kg, 7.2 ft•lb)

d. Remove the camshaft caps and then measure the width of the Plastigauge® "1".

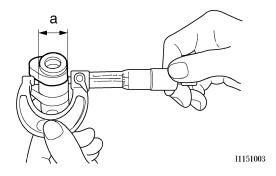


#### 5. Measure:

Camshaft journal diameter "a"
 Out of specification → Replace the camshaft.
 Within specification → Replace the cylinder head and the camshaft caps as a set.



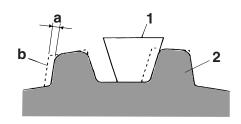
Camshaft journal diameter 21.959–21.972 mm (0.864–0.865 in)



EAS23870

# CHECKING THE TIMING CHAIN AND CAMSHAFT SPROCKET

- 1. Check:
- Timing chain "1"
   Damage/stiffness → Replace the timing chain and camshaft and camshaft sprocket as a set.
- 2. Check:
  - Camshaft sprocket
     More than 1/4 tooth wear "a" → Replace the
     camshaft sprocket and the timing chain as a
     set.



- a. 1/4 tooth
- b. Correct
- 1. Timing chain roller
- 2. Camshaft sprocket

EAS23960

# CHECKING THE TIMING CHAIN TENSIONERS

The following procedure applies to both of the timing chain tensioners.

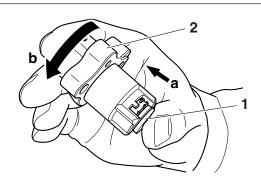
- 1. Check:
- Timing chain tensioner
   Cracks/damage → Replace.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

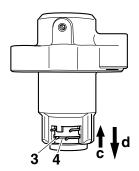
a. Using a finger, push and insert timing chain tensioner rod "1" into the timing chain tensioner housing.

#### NOTE

Push the timing chain tensioner rod in direction "a", and turn the timing chain tensioner body "2" in direction "b" until it stops.



- b. Keep pressing the timing chain tensioner rod, mount clip "3" into groove "4", and lock the timing chain tensioner rod.
- c. Push the timing chain tensioner rod in direction "c".
- d. Make sure that the timing chain tensioner rod can smoothly move out from the timing chain tensioner housing in direction "d". If not smooth, replace the timing chain tensioner assembly.

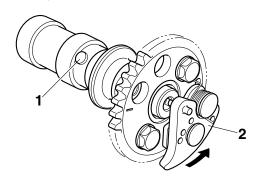


FAS32D1001

# CHECKING THE DECOMPRESSION SYSTEM

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

- 1. Check:
- Decompression system
- a. Check that the decompressor lever pin "1" projects from the camshaft.
- b. Check that the decompressor cam "2" moves smoothly.



EAS24000

#### **INSTALLING THE CAMSHAFTS**

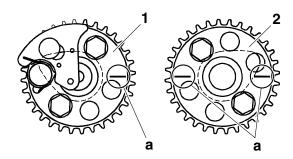
- 1. Install:
- Exhaust camshaft "1"
- Intake camshaft "2"



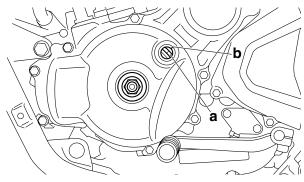
Camshaft sprocket bolt 24 Nm (2.4 m•kg, 17 ft•lb)

#### NOTE:

- Stamp line "a" of the camshaft sprocket must locate in the position as shown.
- Temporarily tighten the camshaft sprocket bolts.



- 2. Install:
  - Intake camshaft sprocket
  - Exhaust camshaft sprocket
- a. Turn the crankshaft counterclockwise.
- b. When piston is at TDC on the compression stroke, align the mark "a" on the generator rotor with the mark "b" on the crankcase cover.



c. Install the timing chain onto both camshaft sprockets and then install the exhaust camshaft onto the cylinder head first.

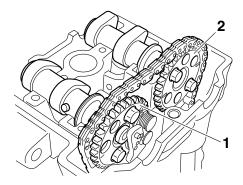
#### NOTE:

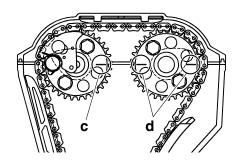
Locate mark "c" of exhaust system camshaft chain sprocket "1" and mark "d" of intake system camshaft chain sprocket "2" in the same position at the end of cylinder head as shown. This is the Top Dead Center (TDC).

ECA13740

#### **CAUTION:**

Do not turn the crankshaft when installing the camshaft(s) to avoid damage or improper valve timing.





- 3. Install:
- Dowel pin
- Camshaft cap
- Camshaft cap bolts

\_\_\_\_

#### NOTE:

- Lubricate the camshaft cap bolt threads with engine oil.
- Finger tighten the camshaft cap bolts.
- 4. Tighten:
  - Camshaft cap bolts



Camshaft cap bolt 10 Nm (1.0 m•kg, 7.2 ft•lb)

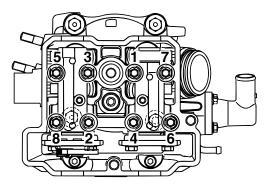
#### NOTE:

Tighten the camshaft cap bolts in the order of the embossed numbers on the camshaft cap.

ECA13730

#### **CAUTION:**

The camshaft cap bolts must be tightened evenly or damage to the cylinder head, camshaft caps, and camshafts will result.

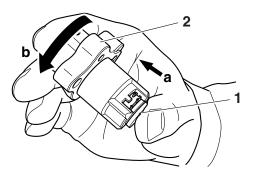


- 5. Install:
  - Timing chain tensioner

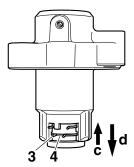
# a. Using a finger, push and insert timing chain tensioner rod "1" into the timing chain tensioner housing.

#### NOTE:

Push the timing chain tensioner rod in direction "a", and turn the timing chain tensioner body "2" in direction "b" until it stops.



b. Keep pressing the timing chain tensioner rod, mount clip "3" into groove "4", and lock the timing chain tensioner rod.



c. In the status of step "b", install the rod assembly in the cylinder block.

NOTE: \_

Always use a new gasket.



Timing chain tensioner bolt 10 Nm (1.0 m•kg, 7.2 ft•lb)

 d. Unlock the camshaft chain tensioner by turning the crankshaft counterclockwise, and tension the timing chain. Refer to "ADJUSTING THE VALVE CLEAR-ANCE" on page 3-4.

#### 

- 6. Turn:
- Crankshaft (several turns counterclockwise)
- 7. Check:
  - The TDC mark of rotor, and the mark of crankshaft case cover

#### 

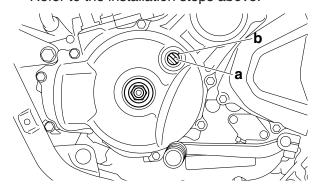
- a. Turn the crankshaft counterclockwise.
- b. When the piston is in the compression process, align TDC mark "a" of the rotor with mark "b" of crankshaft case cover.

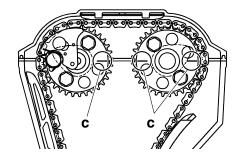
#### NOTE:

You can check the TDC in compression process when the camshaft robes face outward.

Punch mark on the camshaft
 Check the matching of stamp line "c" of the camshaft punch mark timing chain sprocket and the cylinder head end.

Out of alignment  $\rightarrow$  Reinstall. Refer to the installation steps above.

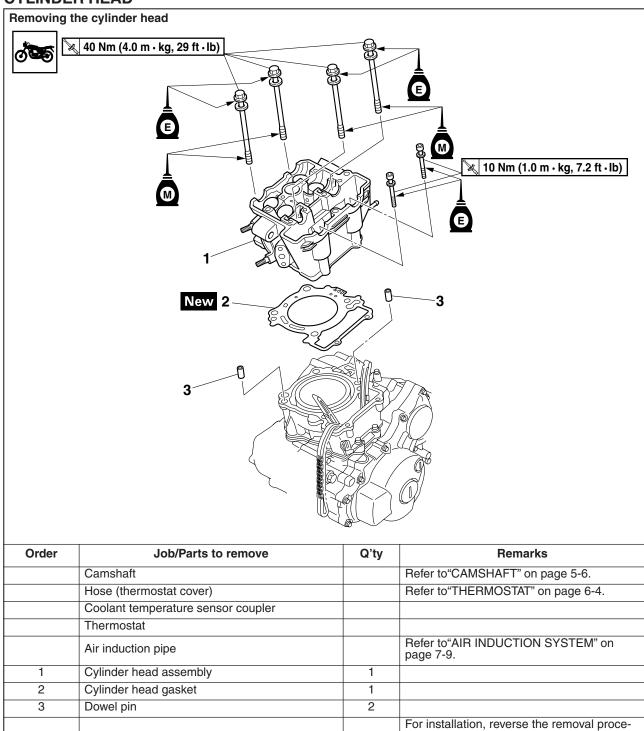




#### 8. Measure:

 $\begin{tabular}{ll} \bullet & \mbox{Valve clearance} \\ \mbox{Out of specification} \to \mbox{Adjust}. \\ \end{tabular}$ 

#### **CYLINDER HEAD**



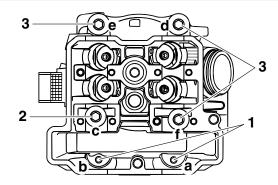
dure.

#### REMOVING THE CYLINDER HEAD

- 1. Remove:
- Cylinder head bolts "1" (M6×60)
- Cylinder head bolts "2" (M10×154)
- Cylinder head bolts "3" (M10×140)

#### NOTE:

Gradually loosen bolts "a" to "f" in this sequence in several times.



EAS24160

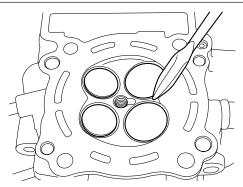
#### **CHECKING THE CYLINDER HEAD**

- 1. Eliminate:
- Combustion chamber carbon deposits (with a rounded scraper)

#### NOTE:

Do not use a sharp instrument to avoid damaging or scratching:

- Spark plug bore threads
- Valve seats



- 2. Check:
  - Cylinder head

 ${\sf Damage/scratches} \to {\sf Replace}.$ 

- Cylinder head water jacket
   Mineral deposits/rust → Eliminate.
- 3. Measure:
  - Cylinder head warpage
     Out of specification → Resurface the cylinder head.



Cylinder head warpage 0.05 mm (0.002 in)

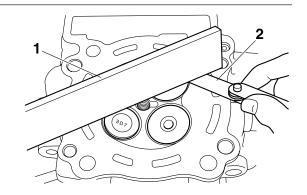
a. Place a straightedge "1" and a thickness gauge "2" across the cylinder head.

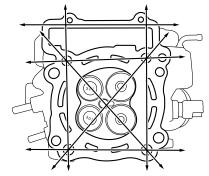
\*\*\*\*\*\*\*\*\*\*

- b. Measure the warpage.
- c. If the limit is exceeded, resurface the cylinder head as follows.
- d. Place a 400–600 grit wet sandpaper on the surface plate and resurface the cylinder head using a figure-eight sanding pattern.

#### NOTE:\_

To ensure an even surface, turn the cylinder head several times.





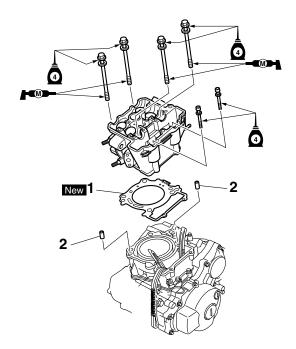
e. After resurfacing, out of specification  $\rightarrow$  Replace the cylinder head.

\_\_\_\_

EAS2423

#### **INSTALLING THE CYLINDER HEAD**

- 1. Install:
- Cylinder head gasket "1" New
- Dowel pins "2"



#### 2. Install:

Cylinder head

NOTE:

Pass the timing chain through the timing chain cavity.

#### 3. Tighten:

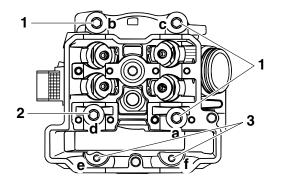
- Cylinder head bolts (M10×140)"1"
- Cylinder head bolts (M10×155)"2"
- Cylinder head bolts (M6×60)"3"

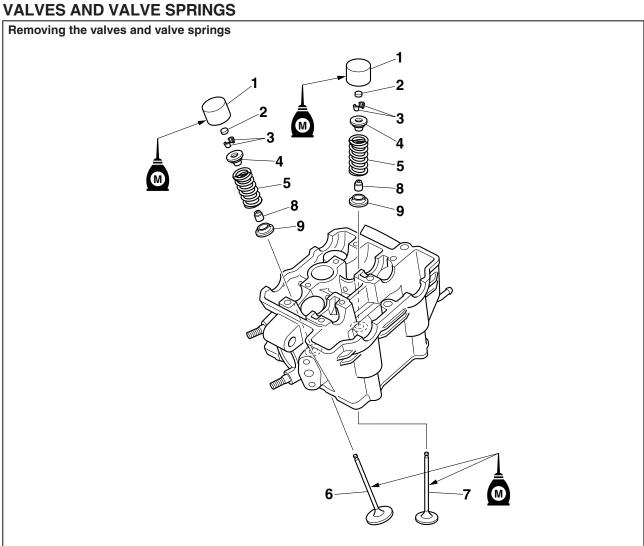


Cylinder head bolt (M10) 40 Nm (4.0 m•kg, 29 ft•lb) Cylinder head bolt (M6) 10 Nm (1.0 m•kg, 7.2 ft•lb)

#### NOTE:

- Lubricate the cylinder head bolts with engine oil.
- Tighten the cylinder head bolts in the proper tightening sequence as shown and torque them in two stages.





| Order | Job/Parts to remove   | Q'ty | Remarks  |
|-------|-----------------------|------|--|
|       | Cylinder head         |      | Refer to "CYLINDER HEAD" on page 5-14.           |
| 1     | Valve lifter          | 4    |  |
| 2     | Valve pad             | 4    |  |
| 3     | Valve cotter          | 8    |  |
| 4     | Valve spring retainer | 4    |  |
| 5     | Valve spring          | 4    |  |
| 6     | Exhaust valve         | 2    |  |
| 7     | Intake valve          | 2    |  |
| 8     | Valve stem seal       | 4    |  |
| 9     | Valve spring seat     | 4    |  |
|       |                       |      | For installation, reverse the removal procedure. |

#### **REMOVING THE VALVES**

The following procedure applies to all of the valves and related components.

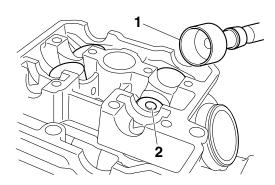
#### NOTE: \_

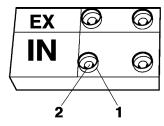
Before removing the internal parts of the cylinder head (e.g., valves, valve springs, valve seats), make sure the valves properly seal.

- 1. Remove:
- Valve lifter "1"
- Valve pad "2"

#### NOTE: \_

Make a note of the position of each valve lifter and valve pad so that they can be reinstalled in their original place.





I1172202

#### 2. Check:

Valve sealing

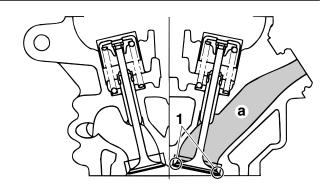
Leakage at the valve seat → Check the valve face, valve seat, and valve seat width.

Refer to "CHECKING THE VALVE SEATS" on page 5-20.

- a. Pour a clean solvent "a" into the intake and exhaust ports.
- b. Check that the valves properly seal.

NOTE:

There should be no leakage at the valve seat "1".



#### 3. Remove:

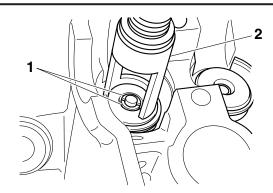
• Valve cotters "1"

#### NOTE:

Remove the valve cotters by compressing the valve spring with the valve spring compressor "2".



Valve spring compressor 90890-04019 YM-04019

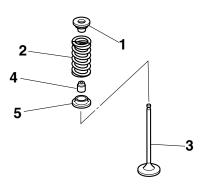


#### 4. Remove:

- Valve spring retainer "1"
- Valve spring "2"
- Valve "3"
- Valve stem seal "4"
- Valve spring seat "5"

#### NOTE:

Identify the position of each part very carefully so that it can be reinstalled in its original place.



# CHECKING THE VALVES AND VALVE GUIDES

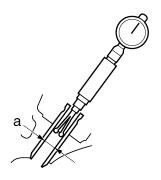
The following procedure applies to all of the valves and valve guides.

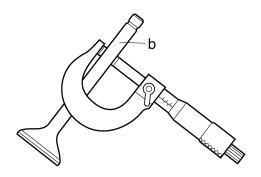
- 1. Measure:
- Valve-stem-to-valve-guide clearance
   Out of specification → Replace the valve guide.

Valve-stem-to-valve-guide clearance = Valve guide inside diameter "a" - Valve stem diameter "b"



Valve-stem-to-valve-guide clear-Valve-stem-to-valve-guide clearance (intake) 0.010-0.037 mm (0.0004-0.0015 in) Limit 0.080 mm (0.0032 in) Limit 0.08 mm (0.0032 in) Valve-stem-to-valve-guide clearance (exhaust) 0.025-0.052 mm (0.0010-0.0020 in) Limit 0.100 mm (0.0039 in) Limit 0.10 mm (0.004 in)



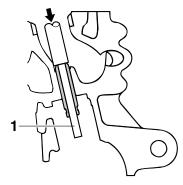


- 2. Replace:
  - Valve guide

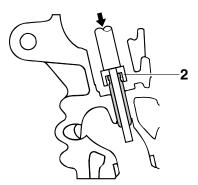
#### NOTE: \_

To ease valve guide removal and installation, and to maintain the correct fit, heat the cylinder head to 100°C (212°F) in an oven.

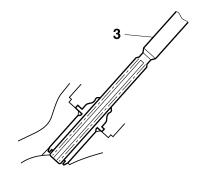
a. Remove the valve guide with the valve guide remover "1".



b. Install the new valve guide with the valve guide installer "2" and valve guide remover "1".



c. After installing the valve guide, bore the valve guide with the valve guide reamer "3" to obtain the proper valve-stem-to-valve-guide clearance.



NOTE:

After replacing the valve guide, reface the valve seat.



Valve guide remover (Ø4.5) 90890-04116 YM-04116 Valve guide installer (Ø4.5) 90890-04117 YM-04117 Valve guide reamer (Ø4.5) 90890-04118 YM-04118

#### 3. Eliminate:

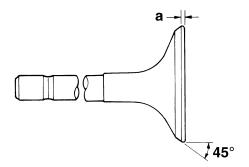
Carbon deposits
 (from the valve face and valve seat)

- 4. Check:
  - Valve face
     Pitting/wear → Grind the valve face.
  - Valve stem end Mushroom shape or diameter larger than the body of the valve stem → Replace the valve.
- 5. Measure:
  - Valve margin thickness "a"
     Out of specification → Replace the valve.

0.70 mm (0.0276 in)



Valve margin thickness
Valve margin thickness D (intake)
1.15–1.45 mm (0.0453–0.0571 in)
Limit
1.00 mm (0.0394 in)
Valve margin thickness D (exhaust)
0.85–1.15 mm (0.0335–0.0453 in)
Limit



#### 6. Measure:

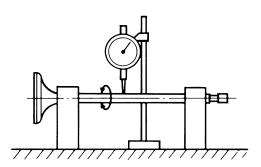
Valve stem runout
 Out of specification → Replace the valve.

#### NOTE

- When installing a new valve, always replace the valve guide.
- If the valve is removed or replaced, always replace the oil seal.



Valve stem runout 0.010 mm (0.0004 in)



EAS24300

#### **CHECKING THE VALVE SEATS**

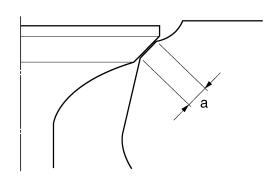
The following procedure applies to all of the valves and valve seats.

- 1. Eliminate:
- Carbon deposits
   (from the valve face and valve seat)
- 2. Check:
  - Valve seat
     Pitting/wear → Replace the cylinder head.
- Measure:
- Valve seat width "a"
   Out of specification → Replace the cylinder head.

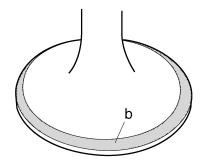


Valve seat width
Valve seat width C (intake)
0.90–1.10 mm (0.0354–0.0433 in)
Valve seat width C (exhaust)
0.90–1.10 mm (0.0354–0.0433 in)

## **VALVES AND VALVE SPRINGS**



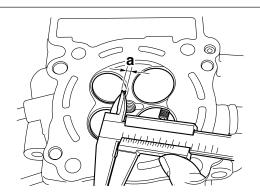
 a. Apply Mechanic's blueing dye (Dykem) "b" onto the valve face.



- b. Install the valve into the cylinder head.
- Press the valve through the valve guide and onto the valve seat to make a clear impression.
- d. Measure the valve seat width "a".

NOTE:

Where the valve seat and valve face contacted one another, the blueing will have been removed.



#### . .

- 4. Lap:
  - Valve face
  - Valve seat

NOTE:

After replacing the cylinder head or replacing the valve and valve guide, the valve seat and valve

face should be lapped.

ECA32D1012

#### **CAUTION:**

This model uses titanium intake valves. Titaium valves that have been used to lap the valve seats must not be used. Always replace lapped valves with new valves.

#### NOTE:

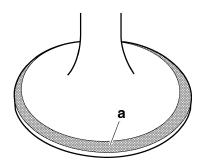
- When replacing the cylinder head, replace the valves without lapping the valve seats and valve faces.
- When replacing the valves or valves guides, use new valves to lap the valve seats, and then replace them with new valves.
- Apply a coarse lapping compound "a" to the valve face.

\*\*\*\*\*\*\*\*\*\*

ECA13790

#### **CAUTION:**

Do not let the lapping compound enter the gap between the valve stem and the valve guide.

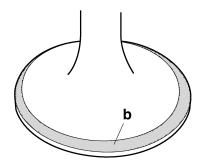


- b. Apply molybdenum disulfide oil onto the valve stem.
- c. Install the valve into the cylinder head.
- d. Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the lapping compound.

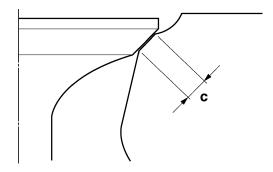
#### NOTE:

For the best lapping results, lightly tap the valve seat while turning the valve back and forth between your hands.

- e. Apply a fine lapping compound to the valve face and repeat the above steps.
- f. After every lapping procedure, be sure to clean off all of the lapping compound from the valve face and valve seat.
- g. Apply Mechanic's blueing dye (Dykem) "b" onto the valve face.



- h. Install the valve into the cylinder head.
- Press the valve through the valve guide and onto the valve seat to make a clear impression.
- j. Measure the valve seat width "c" again. If the valve seat width is out of specification, reface and lap the valve seat.



FAS24310

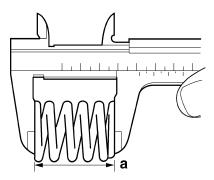
#### **CHECKING THE VALVE SPRINGS**

The following procedure applies to all of the valve springs.

- 1. Measure:
- Valve spring free length "a"
   Out of specification → Replace the valve spring.

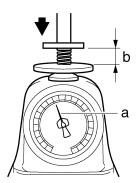


Valve spring free length Free length (intake) 36.03 mm (1.42 in) Limit 34.23 mm (1.35 in) Free length (exhaust) 36.03 mm (1.42 in) Limit 34.23 mm (1.35 in)



#### 2. Measure:

Compressed valve spring force "a"
 Out of specification → Replace the valve spring.



- a. Compressed valve spring force
- b. Installed length

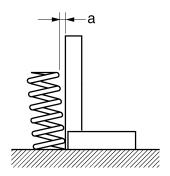


Installed compression spring force (intake)
147.00–169.00 N (33.05–37.99 lbf) (14.99–17.23 kgf)
Installed compression spring force (exhaust)
147.00–169.00 N (33.05–37.99 lbf) (14.99–17.23 kgf)
Installed length
31.00 mm (1.22 in)

- 3. Measure:
  - Valve spring tilt "a"
     Out of specification → Replace the valve spring.



Spring tilt limit Spring tilt (intake) 2.5 °/1.6 mm Spring tilt (exhaust) 2.5 °/1.6 mm



FAS24320

#### **CHECKING THE VALVE LIFTERS**

The following procedure applies to all of the valve lifters.

- 1. Check:
- Valve lifter

Damage/scratches  $\rightarrow$  Replace the valve lifters and cylinder head.

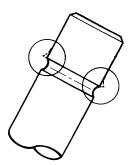


EAS24340

#### **INSTALLING THE VALVES**

The following procedure applies to all of the valves and related components.

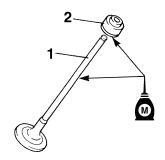
- 1. Deburr:
- Valve stem end (with an oil stone)



- 2. Lubricate:
  - Valve stem "1"
- Valve stem seal "2" (with the recommended lubricant)



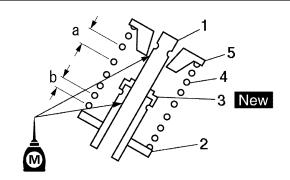
Recommended lubricant Molybdenum disulfide oil



- 3. Install:
  - Valve "1"
  - Spring seat "2"
  - Valve stem seal "3"
  - Valve spring "4"
- Valve spring retainer "5" (onto the cylinder head)

#### NOTE:

- Make sure each valve is installed in its original place. Refer to the following embossed marks.
- Install the valve springs with the larger pitch "a" facing up.



- a. Larger pitch
- b. Smaller pitch
- 4. Install:
  - Valve cotters "1"

#### NOTE:

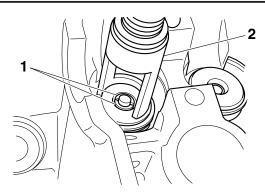
Install the valve cotters by compressing the valve spring with the valve spring compressor "2" and the valve spring compressor attachment.



Valve spring compressor 90890-04019 YM-04019

## **VALVES AND VALVE SPRINGS**

stalled in its original position.

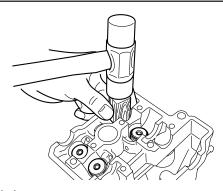


5. To fasten the valve cotters "1" onto the valve stem, lightly tap the valve tip with a soft-face hammer.

ECA13800

#### **CAUTION:**

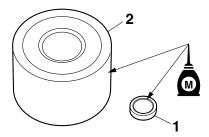
Hitting the valve tip with excessive force could damage the valve.



- 6. Lubricate:
- Valve pad "1"
- Valve lifter "2"



Recommended lubricant Molybdenum disulfide oil

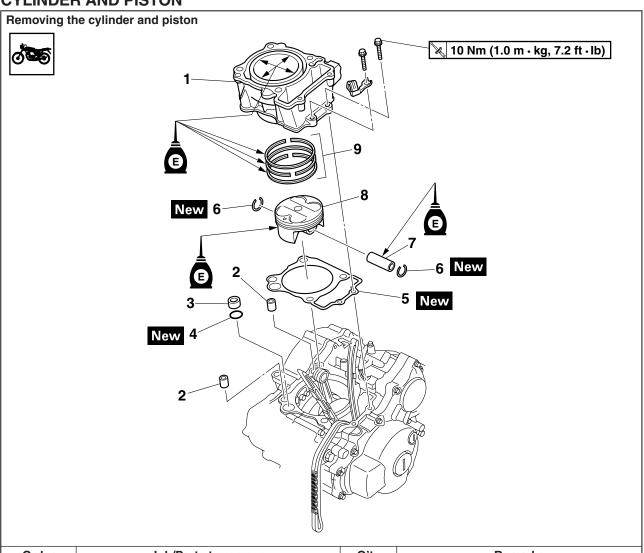


- 7. Install:
- Valve pad
- Valve lifter

#### NOTE:

- The valve lifter must move smoothly when rotated with a finger.
- Each valve lifter and valve pad must be rein-

#### **CYLINDER AND PISTON**



| Order | Job/Parts to remove | Q'ty | Remarks  |
|-------|---------------------|------|--|
|       | Cylinder head       |      | Refer to "CYLINDER HEAD" on page 5-14.           |
| 1     | Cylinder            | 1    |  |
| 2     | Dowel pin           | 2    |  |
| 3     | Water pipe          | 1    |  |
| 4     | O-ring              | 1    |  |
| 5     | Cylinder gasket     | 1    |  |
| 6     | Piston pin clip     | 2    |  |
| 7     | Piston pin          | 1    |  |
| 8     | Piston              | 1    |  |
| 9     | Piston ring set     | 1    |  |
|       |                     |      | For installation, reverse the removal procedure. |

#### CYLINDER AND PISTON

EAS24380

#### **REMOVING THE PISTON**

- 1. Remove:
- Piston pin clips "1"
- Piston pin "2"
- Piston "3"

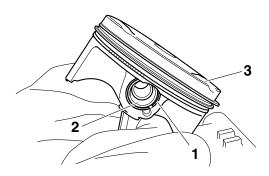
ECA13810

#### **CAUTION:**

Do not use a hammer to drive the piston pin out.

#### NOTE:

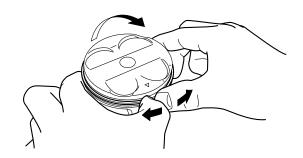
- Before removing the piston pin clip, cover the crankcase opening with a clean rag to prevent the piston pin clip from falling into the crankcase.
- Before removing the piston pin, deburr the piston pin clip's groove and the piston's pin bore area.



- 2. Remove:
  - Top ring
  - 2nd ring
  - Oil ring

NOTE:

When removing a piston ring, open the end gap with your fingers and lift the other side of the ring over the piston crown.



EAS24390

#### **CHECKING THE CYLINDER AND PISTON**

- 1. Check:
- Piston wall (Sidewall)
- Cylinder wall

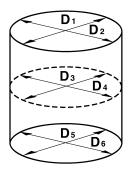
Vertical scratches  $\rightarrow$  Rebore or replace the cylinder, and replace the piston and piston rings as a set.

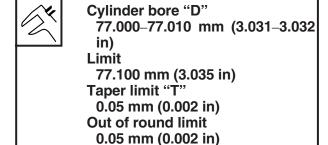
- 2. Measure:
  - Piston-to-cylinder clearance

 Measure cylinder bore "D" with the cylinder bore gauge.

#### NOTE:

Measure cylinder bore "D" by taking side-to-side and front-to-back measurements of the cylinder. Then, find the average of the measurements.

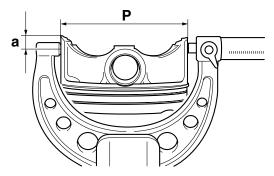




"D" = maximum of  $D_1-D_6$ 

"T" = (maximum of  $D_1$  or  $D_2$ ) - (maximum of  $D_5$  or  $D_6$ )

- If out of specification, rebore or replace the cylinder, and replace the piston and piston rings as a set.
- c. Measure piston skirt diameter "P" with the micrometer.



a. 12 mm (0.47 in) from the bottom edge of the pis-

#### CYLINDER AND PISTON

- d. If out of specification, replace the cylinder, piston and piston rings as a set.
- e. Calculate the piston-to-cylinder clearance with the following formula.

Piston-to-cylinder clearance = Cylinder bore "D" - Piston skirt diameter "P"



Piston-to-cylinder clearance 0.010-0.035 mm (0.0004-0.0014 in) Limit 0.10 mm (0.0039 in)

f. If out of specification, replace the cylinder, piston and piston rings as a set.

## 

EAS24430

#### **CHECKING THE PISTON RINGS**

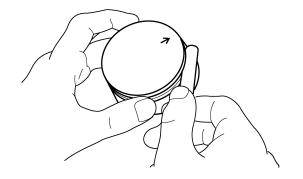
- 1. Measure:
- Piston ring side clearance
   Out of specification → Replace the piston and piston rings as a set.

NOTE:

Before measuring the piston ring side clearance, eliminate any carbon deposits from the piston ring grooves and piston rings.



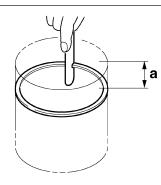
Piston ring side clearance
Top ring side clearance (installed)
0.030-0.065 mm (0.0012-0.0026
in)
Limit
0.115 mm (0.0045 in)
Second ring side clearance (installed)
0.020-0.055 mm (0.0008-0.0022
in)
Limit
0.115 mm (0.0045 in)



- 2. Install:
  - Piston ring (into the cylinder)

#### NOTE

Level the piston ring into the cylinder with the piston crown.



- a. 40 mm (1.57 in)
- 3. Measure:
  - Piston ring end gap
     Out of specification → Replace the piston ring.

#### NOTE:

The oil ring expander spacer's end gap cannot be measured. If the oil ring rail's gap is excessive, replace all three piston rings.



Piston ring end gap
Top ring
End gap (installed)
0.15–0.25 mm (0.0059–0.0098 in)
Limit
0.50 mm (0.020 in)
2nd ring
End gap (installed)
0.30–0.45 mm (0.0118–0.0177 in)
Limit
0.80 mm (0.031 in)
Oil ring
End gap (installed)
0.10–0.40 mm (0.0039–0.0157 in)

EAS24440

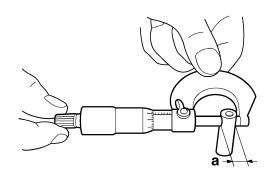
#### **CHECKING THE PISTON PIN**

- 1. Check:
  - Piston pin Blue discoloration/grooves → Replace the piston pin and then check the lubrication system.
- 2. Measure:
- Piston pin outside diameter "a"
   Out of specification → Replace the piston pin.

## **CYLINDER AND PISTON**



Piston pin outside diameter 16.991–17.000 mm (0.6689–0.6693 in) Limit 16.971 mm (0.668 in)

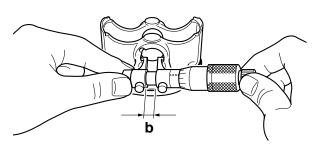


#### 3. Measure:

Piston pin bore diameter "b"
 Out of specification → Replace the piston.



Piston pin bore inside diameter 17.002–17.013 mm (0.6694–0.6698 in) Limit 17.043 mm (0.670 in)



#### 4. Calculate:

Piston-pin-to-piston-pin-bore clearance
 Out of specification → Replace the piston pin and piston as a set.

Piston-pin-to-piston-pin-bore clearance =

Piston pin bore diameter "b" -Piston pin outside diameter "a"



Piston pin/piston pin hole clearance

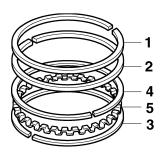
0.002-0.022 mm (0.00008-0.00087 in) EAS24450

#### **INSTALLING THE PISTON AND CYLINDER**

- 1. Install:
- Top ring "1"
- 2nd ring "2"
- Lower oil ring rail "3"
- Upper oil ring rail "4"
- Oil ring expander "5"

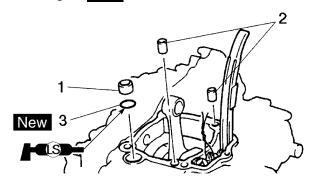
#### NOTE: \_

Be sure to install the piston rings so that the manufacturer's marks or numbers face up.



#### 2. Install:

- Cylinder gasket New
- Water pipe "1"
- Dowel pins "2"
- O-ring "3" New

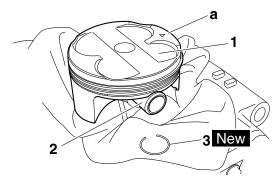


#### 3. Install:

- Piston "1"
- Piston pin "2"
- Piston pin clips "3" New

#### NOTE:

- Apply engine oil the piston pin.
- Make sure the mark "a" on the piston points towards the exhaust side of the cylinder.
- Before installing the piston pin clip, cover the crankcase opening with a clean rag to prevent the clip from falling into the crankcase.

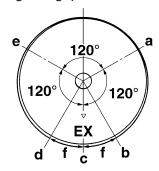


- 4. Lubricate:
  - Piston
  - Piston rings
- Cylinder (with the recommended lubricant)



#### Recommended lubricant Engine oil

- 5. Offset:
- Piston ring end gaps



- a. Top ring
- b. Upper oil ring rail
- c. Oil ring expander
- d. Lower oil ring rail
- e. 2nd ring
- f. 20 mm
- 6. Install:
  - Cylinder

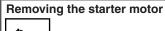


## Cylinder bolt 10 Nm (1.0 m•kg, 7.2 ft•lb)

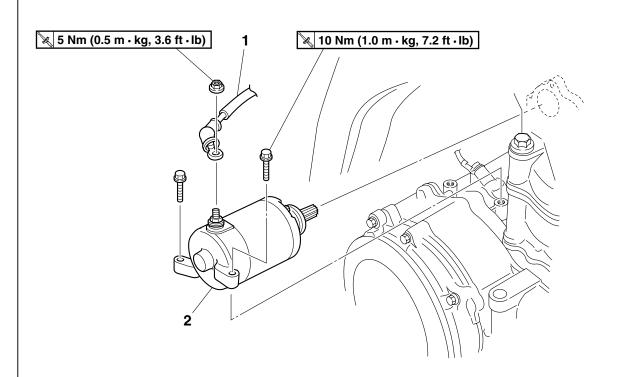
#### NOTE: \_

- While compressing the piston rings with one hand, install the cylinder with the other hand.
- Pass the timing chain and timing chain guide (exhaust side) through the timing chain cavity.

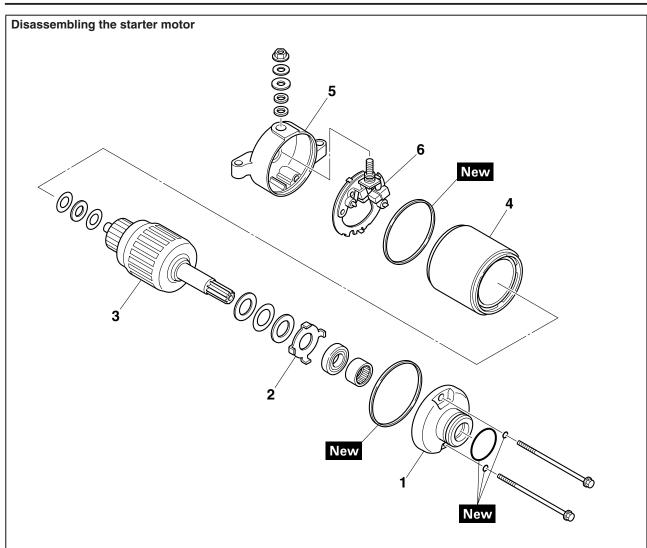
#### **STARTER MOTOR**







| Order | Job/Parts to remove             | Q'ty | Remarks  |
|-------|---------------------------------|------|--|
|       | Seat/Air scoop (left/ritht)     |      | Refer to "GENERAL CHASSIS" on page 4-1.          |
|       | EXUP cable/Exhaust pipe/Muffler |      | Refer to "ENGINE REMOVAL" on page 5-1.           |
| 1     | Starter motor lead              | 1    | Disconnect.                                      |
| 2     | Starter motor                   | 1    |  |
|       |                                 |      | For assembly, reverse the disassembly procedure. |



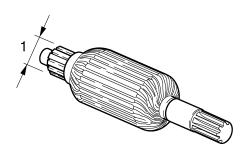
| Order | Job/Parts to remove       | Q'ty | Remarks  |
|-------|---------------------------|------|--|
| 1     | Starter motor front cover | 1    |  |
| 2     | Lock washer               | 1    |  |
| 3     | Armature assembly         | 1    |  |
| 4     | Starter motor yoke        | 1    |  |
| 5     | Starter motor rear cover  | 1    |  |
| 6     | Brush holder set          | 1    |  |
|       |                           |      | For assembly, reverse the disassembly procedure. |

#### CHECKING THE STARTER MOTOR

- 1. Check:
- Commutator
   Dirt → Clean with 600 grit sandpaper.
- 2. Measure:
  - Commutator diameter "1"
     Out of specification → Replace the starter motor.



Limit 27.0 mm (1.06 in)



#### 3. Measure:

• Mica undercut "a"

Out of specification  $\rightarrow$  Scrape the mica to the proper measurement with a hacksaw blade that has been grounded to fit the commutator.



Mica undercut (depth) 0.70 mm (0.03 in)

#### NOTE:

The mica of the commutator must be undercut to ensure proper operation of the commutator.



#### 4. Measure:

 Armature assembly resistances (commutator and insulation)

Out of specification  $\rightarrow$  Replace the starter motor.

a. Measure the armature assembly resistances with the pocket tester.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*



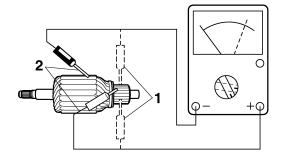
Pocket tester 90890-03112 Analog pocket tester YU-03112-C



**Armature coil** 

Commutator resistance "1" 0.004–0.005  $\Omega$  at 20°C (68°F) Insulation resistance "2" Above 1 M $\Omega$  at 20°C (68°F)

b. If any resistance is out of specification, replace the starter motor.

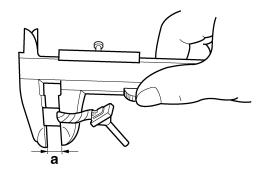


#### Measure:

Brush length "a"
 Out of specification → Replace the brushes as a set.



Limit 3.50 mm (0.14 in)



#### 6. Measure:

Brush spring force
 Out of specification → Replace the brush springs as a set.



Brush spring force 7.16-9.52 N (25.77-34.27 oz) (730-971 gf)

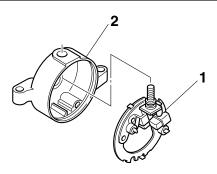
- 7. Check:
  - Gear teeth
     Damage/wear → Replace the gear.
- 8. Check:
- Bearing
- $\bullet$  Oil seal Damage/wear  $\rightarrow$  Replace the defective part (s).

#### **ASSEMBLING THE STARTER MOTOR**

- 1. Install:
- Brush holder "1"

NOTE: \_

Align the tab on the brush seat with the slot in the starter motor rear cover "2".

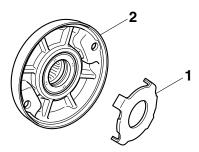


#### 2. Install:

• Thrust support "1"

NOTE: \_

Align the tab of thrust support with the slot of stator motor front cover "2".

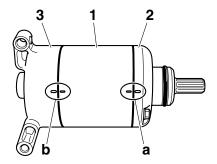


#### 3. Install:

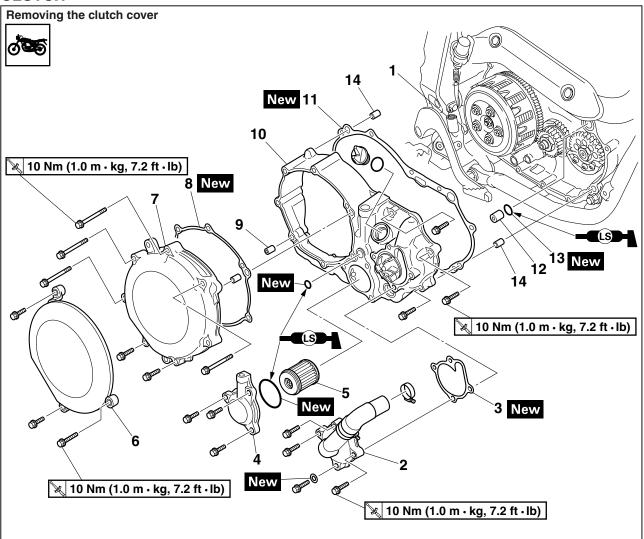
- Starter motor yoke "1"
- Starter motor front cover "2"
- Starter motor rear cover "3"

NOTE:

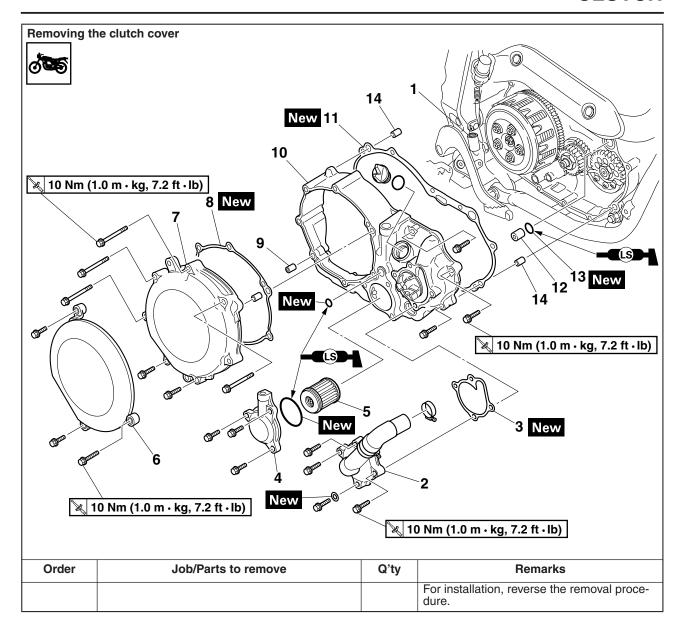
Align the match marks on the starter motor yoke with the match marks on the starter motor front cover "a" and starter motor rear cover "b".

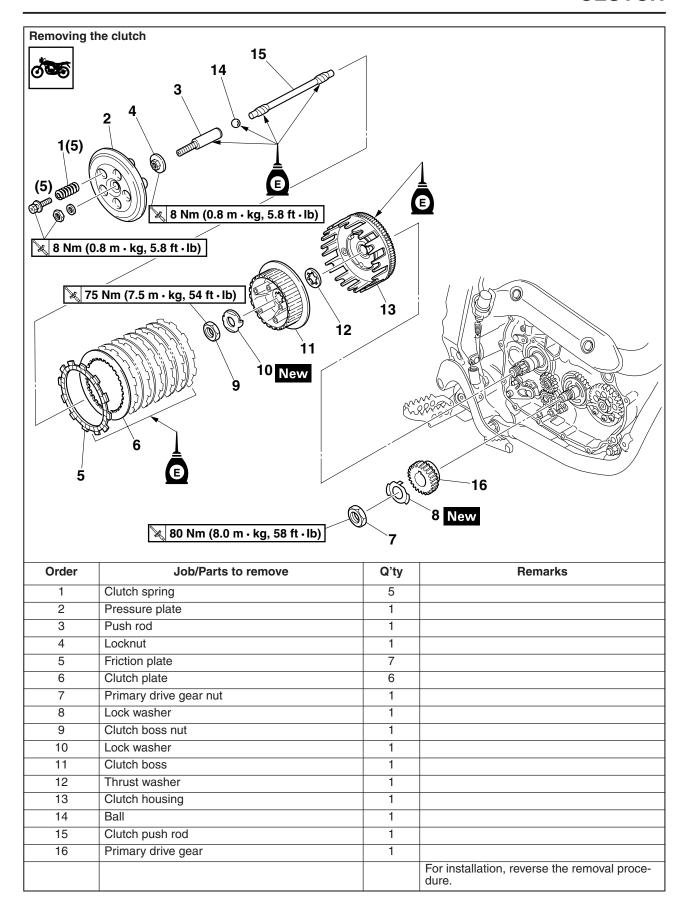


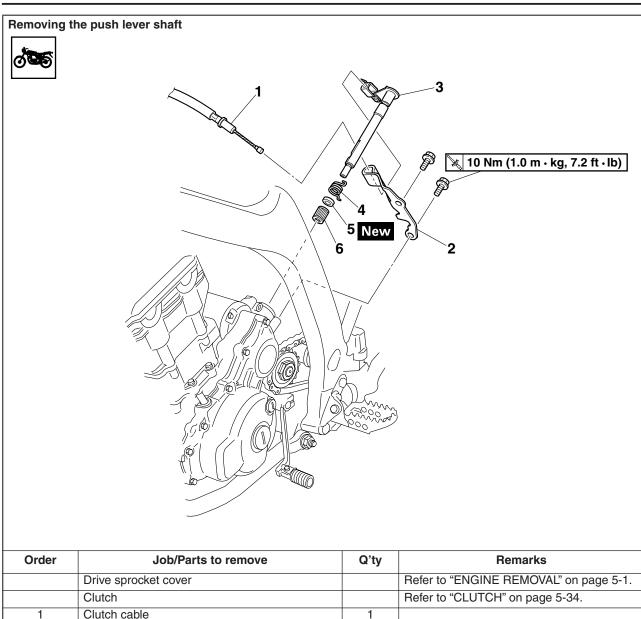
#### **CLUTCH**



| Order | Job/Parts to remove           | Q'ty | Remarks   |
|-------|-------------------------------|------|---|
|       | Drain the engine oil          |      | Refer to "CHANGING THE ENGINE OIL" on page 3-11.                          |
|       | Drain the coolant             |      | Refer to "CHANGING THE COOLANT" on page 3-18.                             |
| 1     | Brake pedal spring            | 1    | Remove it from the frame mounting hook.                                   |
| 2     | Water pump housing cover      | 1    |   |
| 3     | Gasket                        | 1    |   |
| 4     | Oil cleaner element cover     | 1    |   |
| 5     | Oil cleaner element           | 1    |   |
| 6     | Cover                         | 1    |   |
| 7     | Clutch cover                  | 1    | Remove the clutch cover only if you do not remove the primary drive gear. |
| 8     | Clutch cover gasket           | 1    |   |
| 9     | Dowel pin                     | 2    |   |
| 10    | Crankcase cover (right)       | 1    |   |
| 11    | Crankcase cover right gascket | 1    |   |
| 12    | Water pipe                    | 1    |   |
| 13    | O-ring                        | 1    |   |
| 14    | Dowel pin                     | 2    |   |







| Order | Job/Parts to remove  | Q'ty | Remarks  |
|-------|----------------------|------|--|
|       | Drive sprocket cover |      | Refer to "ENGINE REMOVAL" on page 5-1.           |
|       | Clutch               |      | Refer to "CLUTCH" on page 5-34.                  |
| 1     | Clutch cable         | 1    |  |
| 2     | Clutch cable holder  | 1    |  |
| 3     | Push lever shaft     | 1    |  |
| 4     | Push lever spring    | 1    |  |
| 5     | Oil seal             | 1    |  |
| 6     | Bearing              | 1    |  |
|       |                      |      | For installation, reverse the removal procedure. |

#### REMOVING THE CLUTCH

You need not drain the coolant and engine oil if you do not service the primary drive gear.

You can reach the clutch housing removal step by simply removing the cover and clutch cover.

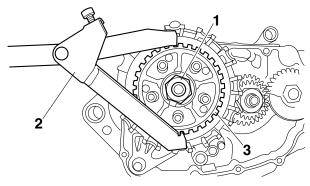
- 1. Straighten the lock washer tab.
- 2. Loosen:
  - Clutch boss nut "1"

#### NOTE:

While holding the clutch boss "3" with the universal clutch holder "2", loosen the clutch boss nut.



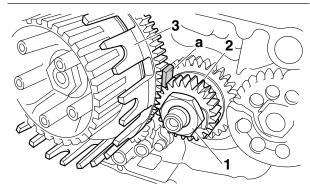
Universal clutch holder 90890-04086 YM-91042



- 3. Straighten the lock washer tab.
- 4. Remove:
  - Primary drive gear nut "1"
  - Lock washer

#### NOTE:

Insert aluminum plate "a" between primary drive gear "2" and clutch housing "3", and remove these parts by loosening the primary drive gear nut.



EAS25100

#### **CHECKING THE FRICTION PLATES**

The following procedure applies to all of the friction plates.

- 1. Check:
- Friction plate

Damage/wear  $\rightarrow$  Replace the friction plates as a set.

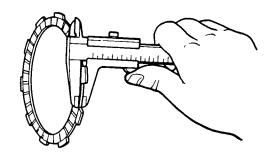
- 2. Measure:
  - Friction plate thickness
     Out of specification → Replace the friction plates as a set.

#### NOTE:

Measure the friction plate at four places.



Friction plate thickness 2.90–3.10 mm (0.114–0.122 in) Limit 2.80 mm (0.110 in)



EAS25110

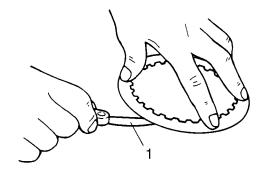
#### CHECKING THE CLUTCH PLATES

The following procedure applies to all of the clutch plates.

- 1. Check:
- Clutch plate
   Damage → Replace the clutch plates as a set.
- 2. Measure:
  - Clutch plate warpage
     (with a surface plate and thickness gauge "1")
     Out of specification → Replace the clutch plates as a set.



Warpage limit 0.10 mm (0.0039 in)



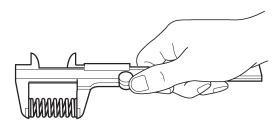
#### **CHECKING THE CLUTCH SPRINGS**

The following procedure applies to all of the clutch springs.

- 1. Check:
- Clutch spring
   Damage → Replace the clutch springs as a set.
- 2. Measure:
  - Clutch spring free length
     Out of specification → Replace the clutch
     springs as a set.



Clutch spring free length 41.20 mm (1.62 in) Limit 39.14 mm (1.54 in)



I1412901

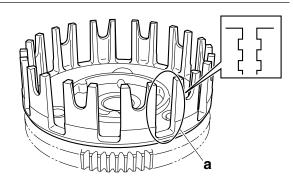
EAS25150

#### **CHECKING THE CLUTCH HOUSING**

- 1. Check:
- Clutch housing dogs "a"
   Damage/pitting/wear → Deburr the clutch housing dogs or replace the clutch housing.

#### NOTE:

Pitting on the clutch housing dogs will cause erratic clutch operation.



EAS25160

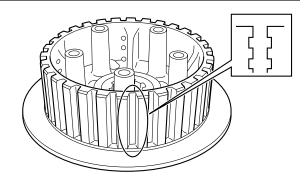
#### **CHECKING THE CLUTCH BOSS**

- 1. Check:
- Clutch boss splines
   Damage/pitting/wear → Replace the clutch boss.

NOTE:

Pitting on the clutch boss splines will cause er-

ratic clutch operation.



#### 2. Check:

Primary driven gear

Damage/wear  $\rightarrow$  Replace the primary drive and clutch housing as a set.

Excessive noise during operation  $\rightarrow$  Replace the primary drive and clutch housing as a set.

EAS2517

#### **CHECKING THE PRESSURE PLATE**

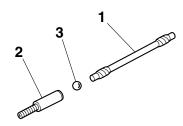
- 1. Check:
- Pressure plate "1"
   Cracks/damage → Replace.

EAS25190

#### **CHECKING THE CLUTCH PUSH RODS**

- 1. Check:
- Push rod "1"
- Push rod "2"
- Ball "3"

Cracks/damage/wear  $\rightarrow$  Replace.



#### 2. Measure:

Push rod bending limit
 Out of specification → Replace the defective part (s).



Push rod bending limit 0.100 mm (0.004 in)

#### **CHECKING THE PRIMARY DRIVE GEAR**

- 1. Check:
- Primary drive gear

Damage/wear  $\rightarrow$  Replace the primary drive and primary driven gears as a set.

Excessive noise during operation  $\rightarrow$  Replace the primary drive and primary driven gears as a set.

EAS25210

#### CHECKING THE PRIMARY DRIVEN GEAR

- 1. Check:
- Primary driven gear

Damage/wear  $\rightarrow$  Replace the primary drive and primary driven gears as a set.

Excessive noise during operation  $\rightarrow$  Replace the primary drive and primary driven gears as a set.

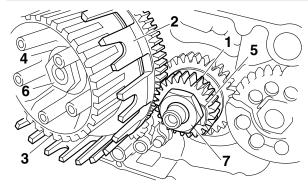
EAS25260

#### INSTALLING THE CLUTCH

- 1. Install:
- Primary drive gear "1"
- Clutch housing "2"
- Thrust washer
- Clutch boss "3"
- Lock washer "4" New
- Lock washer "5" New
- Clutch boss nut "6"
- Primary drive gear nut "7"

#### NOTE:

- Align the lock washer projection with the clutch boss slit during assembling.
- Install the primary drive gear by facing its flat face toward the crankcase.



2. Tighten:

Clutch boss nut "1"

NOTE:

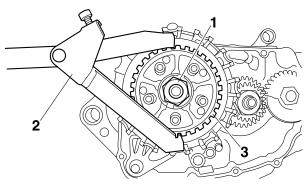
While holding the clutch boss "3" with the universal clutch holder "2", tighten the clutch boss nut.



Universal clutch holder 90890-04086 YM-91042



Clutch boss nut 75 Nm (7.5 m•kg, 54 ft•lb)



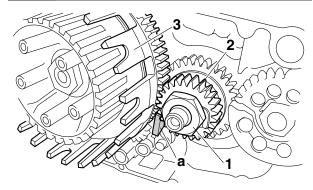
- 3. Bend the lock washer tab along a flat side of the nut.
- 4. Tighten:
  - Primary drive gear nut "1"

#### NOTE:

Insert aluminum plate "a" between primary drive gear "2" and clutch housing "3", and tighten the primary drive gear nut.



Primary drive gear nut 80 Nm (8.0 m•kg, 58 ft•lb)



- 5. Bend the lock washer tab along a flat side of the nut.
- 6. Lubricate:
- Friction plates
- Clutch plates (with the recommended lubricant)
- Push rod
- Push rod1
- Ball



Recommended lubricant Engine oil

- 7. Install:
- Friction plates
- Clutch plates

#### NOTE:

First, install a friction plate and then alternate between a clutch plate and a friction plate.

- 8. Install:
- Push plate
- Push rod (onto the clutch pressure plate.)
- 9. Install:
  - Push rod
  - Ball
  - Pressure plate
  - Clutch spring

#### 10. Tighten:

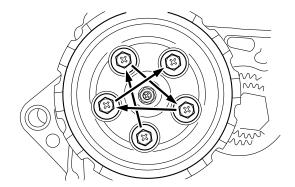
- Push rod
- Clutch spring

#### NOTE:

Tighten the clutch spring bolts in two stages and in a crisscross pattern.



Locknut 8 Nm (0.8 m•kg, 5.8 ft•lb) Clutch spring bolt 8 Nm (0.8 m•kg, 5.8 ft•lb)

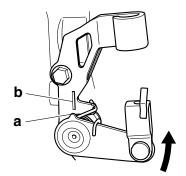


#### 11.Check:

Push lever position
 Push lever mark "a" and crankcase mark "b" not aligned → Correct.

#### NOTE:

Move the push lever in the arrow direction, and make sure that its movement becomes hard in the position where the marks match.



#### 12.Adjust:

• Push lever position

#### a. Loosen locknut "2" of push rod "1".

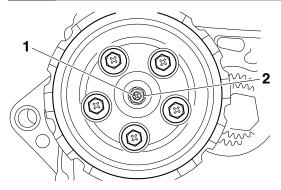
 Return or tighten push rod "1" until the mark of push lever matches the mark of clutch cable holder.

\*

c. Hold the push rod (not to move it), and tighten the push rod locknut.



Lock nut 8 Nm (0.8 m•kg, 5.8 ft•lb)



#### 13.Install:

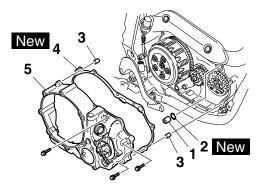
- Water pipe "1"
- O-ring "2" New
- Dowel pin "3"
- Crankcase cover right gascket "4" New
- Crankcase cover (right) "5"



Crankcase cover (right) bolt 10 Nm (1.0 m•kg, 7.2 ft•lb)

#### NOTE:

- Tighten bolts in a crisscross pattern.
- Turn the impeller shaft and check the engaging of impeller shaft gear and primary drive gear, and assemble the right crankcase cover.



#### 14.Install:

 Oil cleaner element Refer to "CHANGING THE ENGINE OIL" on page 3-11.

#### 15.Install:

• Water pump housing cover Refer to "WATER PUMP" on page 6-6.

#### 16.Fill:

 Crankcase (with the specified amount of the engine oil) Refer to "CHANGING THE ENGINE OIL" on page 3-11.

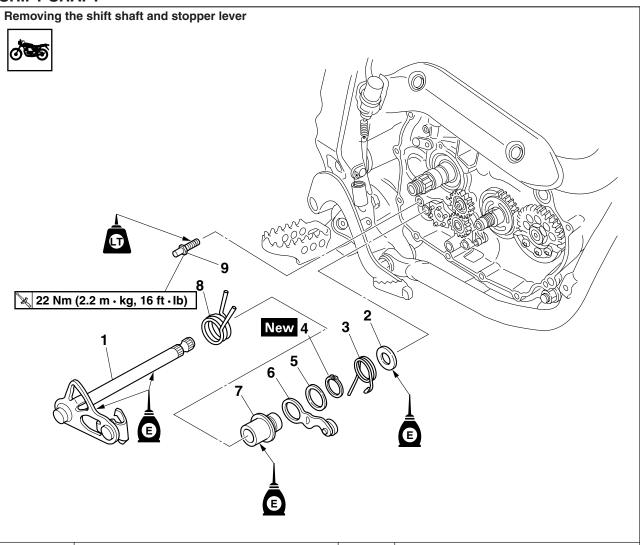
#### 17.Fill:

 Cooling system (with the specified amount of the the coolant) Refer to "CHANGING THE COOLANT" on page 3-18.

#### 18.Install:

• Brake spring

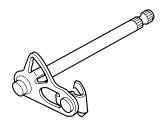
#### **SHIFT SHAFT**

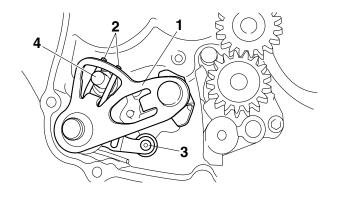


| Order | Job/Parts to remove  | Q'ty | Remarks  |
|-------|----------------------|------|--|
|       | Shift pedal          |      | Refer to "ENGINE REMOVAL" on page 5-1.           |
|       | Clutch housing       |      | Refer to "CLUTCH" on page 5-34.                  |
| 1     | Shift shaft          | 1    |  |
| 2     | Plate washer         | 1    |  |
| 3     | Stopper lever spring | 1    |  |
| 4     | Circlip              | 1    |  |
| 5     | Plate washer         | 1    |  |
| 6     | Stopper lever        | 1    |  |
| 7     | Spacer               | 1    |  |
| 8     | Shift shaft spring   | 1    |  |
| 9     | Stopper screw        | 1    |  |
|       |                      |      | For installation, reverse the removal procedure. |

#### **CHECKING THE SHIFT SHAFT**

- 1. Check:
- Shift shaft
- $\bullet \mbox{ Shift lever} \\ \mbox{ Bends/damage/wear} \rightarrow \mbox{ Replace}.$
- Shift lever spring Damage/wear → Replace.





EAS25430

#### **CHECKING THE STOPPER LEVER**

- 1. Check:
- Stopper lever
   Bends/damage → Replace.
   Roller turns roughly → Replace the stopper lever.



EAS25450

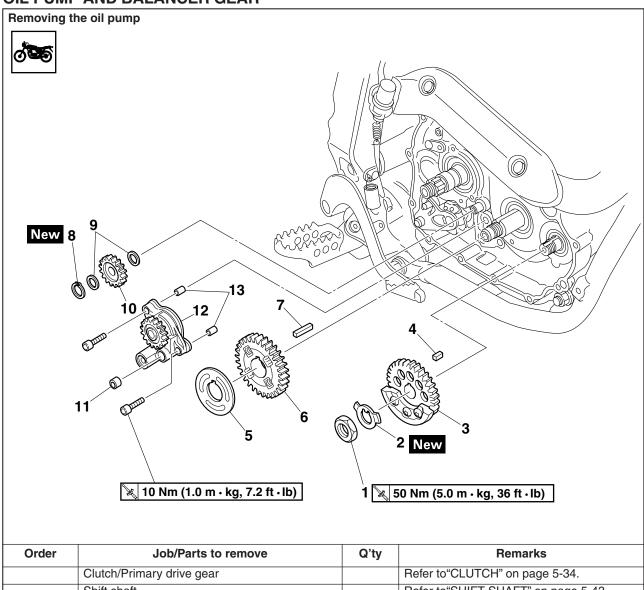
#### **INSTALLING THE SHIFT SHAFT**

- 1. Install:
- Shift shaft "1"
- Shift shaft spring "2"
- Stopper lever "3"
- Stopper lever spring

NOTE:

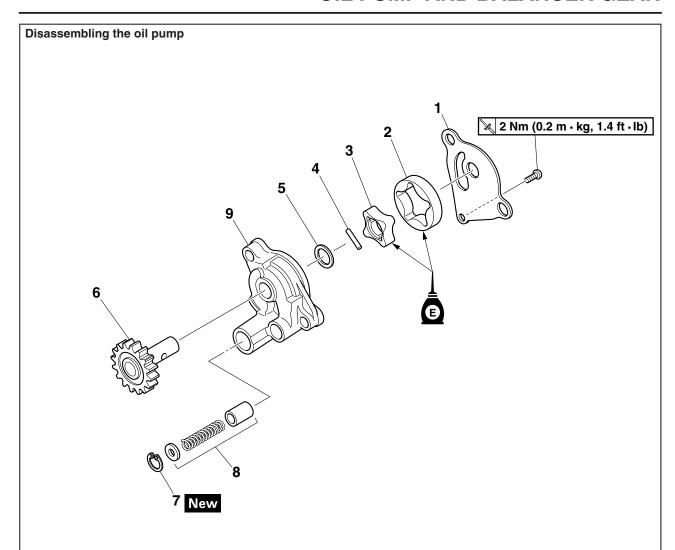
- Hook the ends "4" of the stopper lever spring onto the stopper lever and the crankcase boss.
- Mesh the stopper lever with the shift drum segment assembly.

#### **OIL PUMP AND BALANCER GEAR**



| Order | Job/Parts to remove       | Q'ty | Remarks  |
|-------|---------------------------|------|--|
|       | Clutch/Primary drive gear |      | Refer to "CLUTCH" on page 5-34.                  |
|       | Shift shaft               |      | Refer to "SHIFT SHAFT" on page 5-43.             |
| 1     | Balancer weight gear nut  | 1    |  |
| 2     | Lock washer               | 1    |  |
| 3     | Balancer weight gear      | 1    |  |
| 4     | Straight key              | 1    |  |
| 5     | Absorber plate            | 1    |  |
| 6     | Balancer drive gear       | 1    |  |
| 7     | Straight key              | 1    |  |
| 8     | Circlip                   | 1    |  |
| 9     | Plain washer              | 2    |  |
| 10    | Idle gear                 | 1    |  |
| 11    | Gasket                    | 1    |  |
| 12    | Oil pump assembly         | 1    |  |
| 13    | Dowel pin                 | 2    |  |
|       |                           |      | For installation, reverse the removal procedure. |

## **OIL PUMP AND BALANCER GEAR**

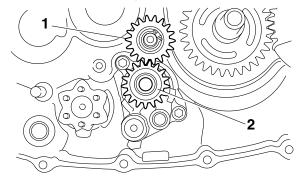


| Order | Job/Parts to remove   | Q'ty | Remarks  |
|-------|-----------------------|------|--|
| 1     | Pump cover            | 1    |  |
| 2     | Outer rotor           | 1    |  |
| 3     | Inner rotor           | 1    |  |
| 4     | Dowel pin             | 1    |  |
| 5     | Plain washer          | 1    |  |
| 6     | Driven gear           | 1    |  |
| 7     | Circlip               | 1    |  |
| 8     | Relief valve assembly | 1    |  |
| 9     | Oil pump housing      | 1    |  |
|       |                       |      | For installation, reverse the removal procedure. |

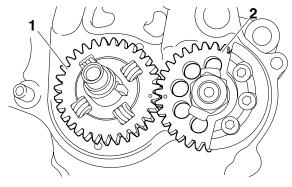
FAS24940

#### REMOVING THE OIL PUMP

- 1. Drain:
- Engine oil (completely from the crankcase) Refer to "CHANGING THE ENGINE OIL" on page 3-11.
- 2. Remove:
  - Idle gear "1"
  - Oil pump assembly "2"



- 3. Remove:
- Balancer weight gear "1"
- Balancer drive gear assembly "2"

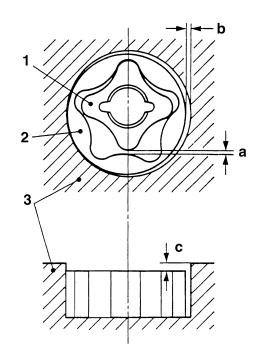


#### CHECKING THE OIL PUMP

- 1. Check:
- Oil pump drive gear
- Oil pump driven gear
- Oil pump housing
- Oil pump housing cover Cracks/damage/wear → Replace the defective part (s).
- 2. Measure:
  - Inner-rotor-to-outer-rotor-tip clearance "a"
  - Outer-rotor-to-oil-pump-housing clearance "b"
  - Oil-pump-housing-to-inner-rotor-and-outer-rotor clearance "c" Out of specification  $\rightarrow$  Replace the oil pump.



Inner-rotor-to-outer-rotor-tip clearance Less than 0.120 mm (0.0047 in) Outer-rotor-to-oil-pump-housing clearance 0.090-0.160 mm (0.0004-0.0013 in) Limit 0.230 mm (0.0091 in) Oil-pump-housing-to-inner-rotor-and-outer-rotor clearance 0.030-0.100 mm (0.0012-0.0039 in) Limit 0.170 mm (0.0067 in)



- 1. Inner rotor
- 2. Outer rotor
- 3. Oil pump housing
- 3. Check:
- Oil pump operation Rough movement → Repeat steps (1) and (2) or replace the defective part (s).

EAS25000

#### ASSEMBLING THE OIL PUMP

- 1. Lubricate:
  - Inner rotor
  - Outer rotor
  - Oil pump shaft (with the recommended lubricant)

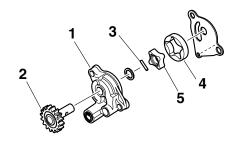


#### Recommended lubricant Engine oil

- 2. Install:
  - Oil pump housing "1"
  - Relief valve assembly
  - Driven gear "2"
  - Dowel pin "3"
  - Outer rotor "4"
- Inner rotor "5"
- Oil pump cover



Oil pump cover screw 2 Nm (0.2 m•kg, 1.4 ft•lb)



- 3. Check:
  - Oil pump operation Refer to "CHECKING THE OIL PUMP" on page 5-47.

EAS32D1008

## INSTALLING THE OIL PUMP AND BALANCER GEAR

- 1. Install:
- Oil pump assembly



Oil pump bolt 10 Nm (1.0 m•kg, 7.2 ft•lb)

ECA13890

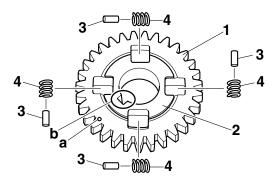
#### **CAUTION:**

After tightening the bolts, make sure the oil pump turns smoothly.

- 2. Install:
  - Drive gear "1"
  - Buffer boss "2"
  - Dowel pin "3"
- Spring "4" (to driven gear)

NOTE: \_

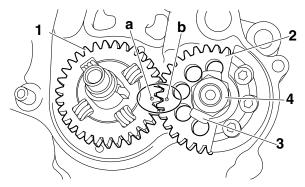
- Align mark "a" of the drive gear with slot "b" of the buffer boss.
- Install the dowel pin on the spring as shown.



- 3. Install:
  - Drive gear "1"
  - Balancer weight gear "2"
  - Lock washer "3" New
  - Balancer weight gear nut "4"

#### NOTE:

Align mark "a" of the drive gear with mark "b" of the balancer shaft weight gear during assembling.



- 4. Tighten:
- Primary drive gear nut Refer to "CLUTCH" on page 5-34.
- 5. Tighten:
- Balancer weight gear nut "1"

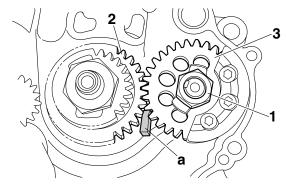


Blancer weight gear nut 50 Nm (5.0 m•kg, 36 ft•lb)

#### NOTE:

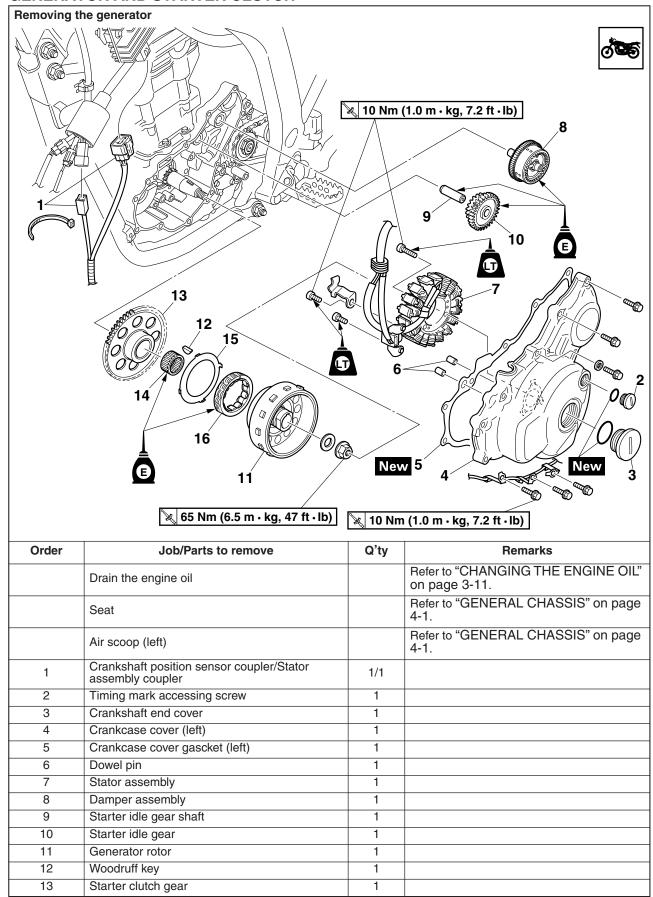
Insert aluminum plate "a" between drive gear "2" and balancer weight gear "3", and tighten the primary drive gear nut.

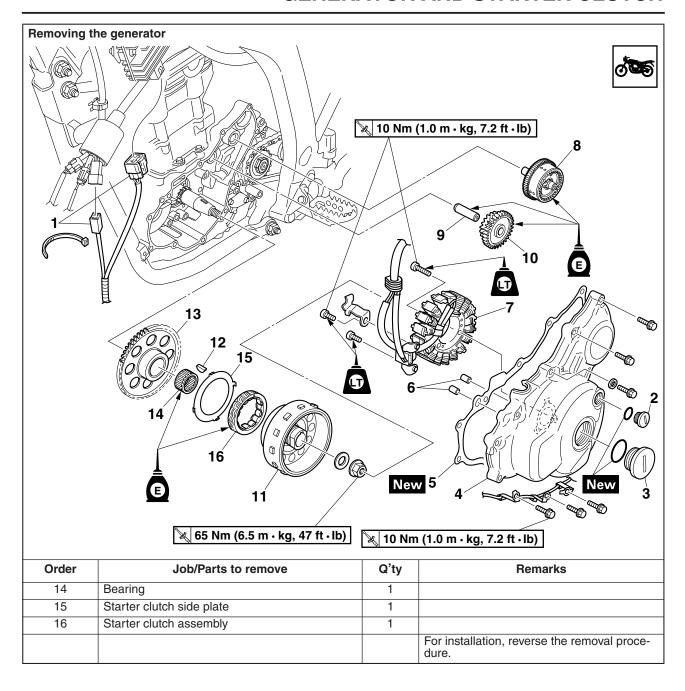
## **OIL PUMP AND BALANCER GEAR**

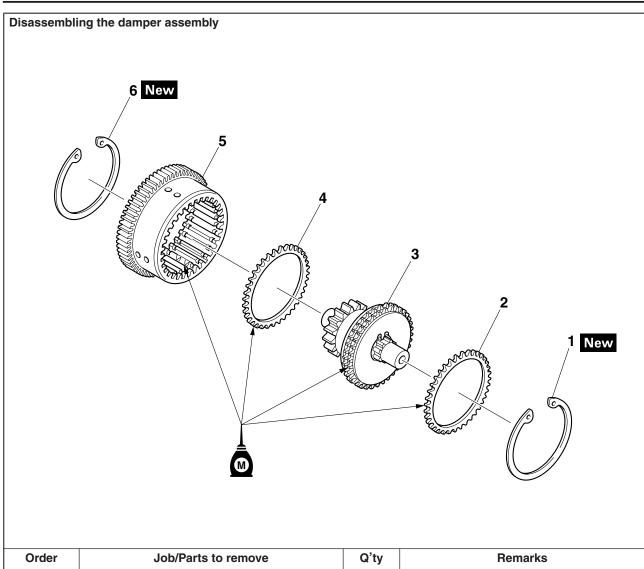


#### 6. Install:

Be sure to bend the lock washer tab along to the nut side face.







| Order | Job/Parts to remove    | Q'ty | Remarks  |
|-------|------------------------|------|--|
| 1     | Circlip                | 1    |  |
| 2     | Limiter disc           | 1    |  |
| 3     | Starter reduction gear | 1    |  |
| 4     | Limiter disc           | 1    |  |
| 5     | Outer torque limiter   | 1    |  |
| 6     | Circlip                | 1    |  |
|       |                        |      | For installation, reverse the removal procedure. |

FAS24490

#### REMOVING THE GENERATOR

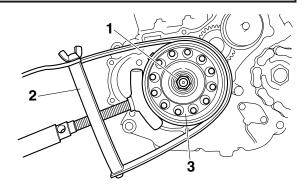
- 1. Remove:
- Generator rotor nut "1"
- Washer

#### NOTE:

- While holding the generator rotor "3" with the sheave holder "2", loosen the generator rotor nut.
- Do not allow the sheave holder to touch the projection on the generator rotor.



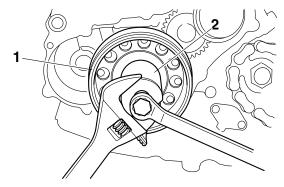
Sheave holder 90890-01701 Primary clutch holder YS-01880-A



- 2. Remove:
  - Generator rotor "1" (with the rotor puller "2")
- Woodruff key



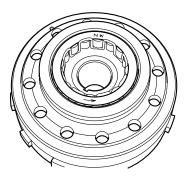
Rotor puller 90890-04142 YM-04142



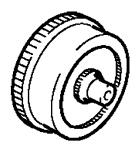
EAS24570

#### **CHECKING THE STARTER CLUTCH**

- 1. Check:
- Starter clutch rollers
   Damage/wear → Replace.

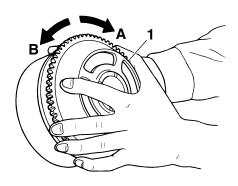


- 2. Check:
- Starter clutch idle gear
- Starter clutch gear
   Burrs/chips/roughness/wear → Replace the defective part (s).
- 3. Check:
  - Starter clutch gear
     Damage/pitting/wear → Replace the starter clutch gear.
- 4. Check:
  - Damper assembly Damage/pitting/wear → Replace the damper assembly.
    - Check the gear of the starter motor armature.



- 5. Check:
- Starter clutch operation
- a. Install the starter clutch drive gear "1" onto the starter clutch and hold the starter clutch.
- b. When turning the starter clutch drive gear clockwise "A", the starter clutch and the starter clutch drive gear should engage, otherwise the starter clutch is faulty and must be replaced.
- c. When turning the starter clutch drive gear counterclockwise "B", it should turn freely, otherwise the starter clutch is faulty and must be replaced.

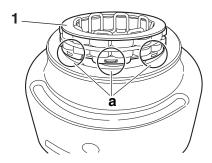
### **GENERATOR AND STARTER CLUTCH**



EAS24600

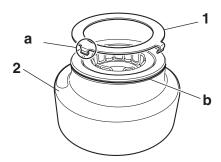
#### INSTALLING THE STARTER CLUTCH

- 1. Install:
- Starter clutch assembly "1"
   Push the starter clutch assembly strongly until bumping. (Turn the projection part "a" to the interior side.)



#### 2. Install:

• Starter clutch side plate "1" Set the 4 tabs "a" of the starter clutch side plate to the groove "b" of the generator rotor "2" securely.



EAS24500

#### **INSTALLING THE GENERATOR**

- 1. Install:
- Woodruff key
- Generator rotor
- Washer
- Generator rotor bolt

#### NOTE:

- Clean the tapered portion of the crankshaft and the generator rotor hub.
- When installing the generator rotor, make sure the woodruff key is properly sealed in the keyway of the crankshaft.
- 2. Tighten:
- Generator rotor nut "1"



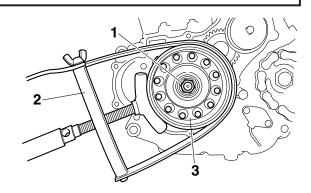
Generator rotor nut 65 Nm (6.5 m•kg, 47 ft•lb)

#### NOTE:

- While holding the generator rotor "3" with the sheave holder "2", tighten the generator rotor bolt.
- Do not allow the sheave holder to touch the projection on the generator rotor.



Sheave holder 90890-01701 Primary clutch holder YS-01880-A



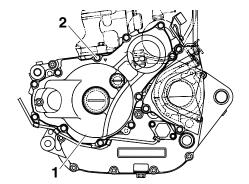
- 3. Install:
- Starter idler gears
- 4. Install:
  - Left crankcase cover "1"



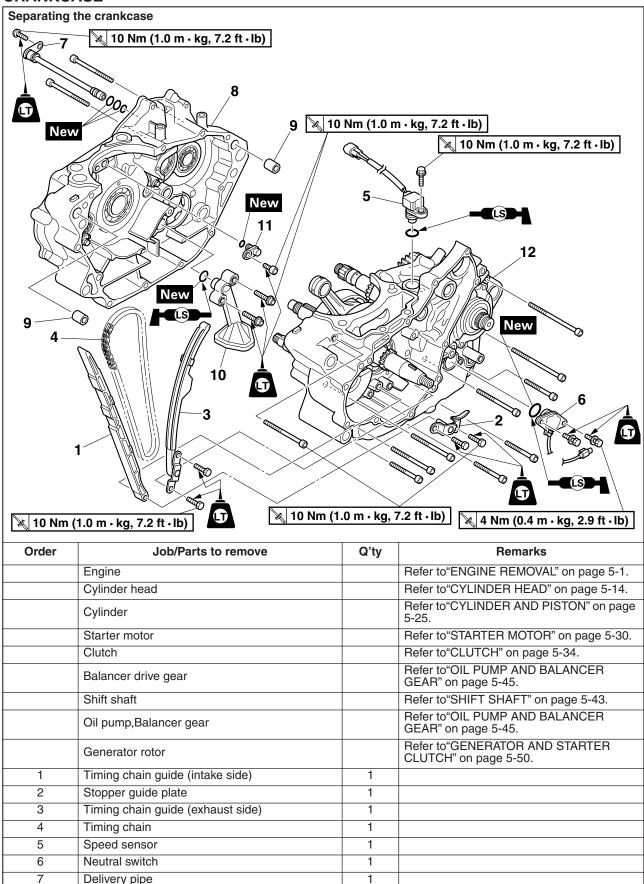
Crankcase cover bolt 10 Nm (1.0 m•kg, 7.2 ft•lb)

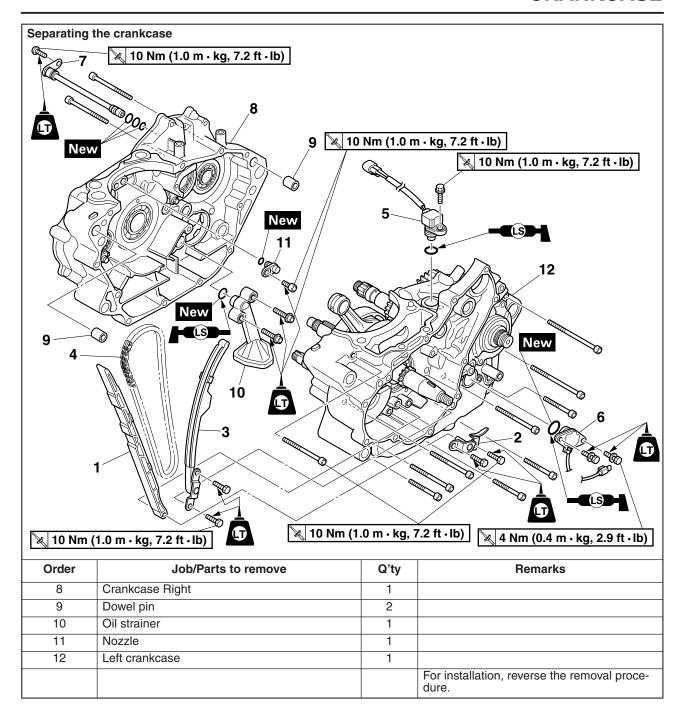
#### NOTE:

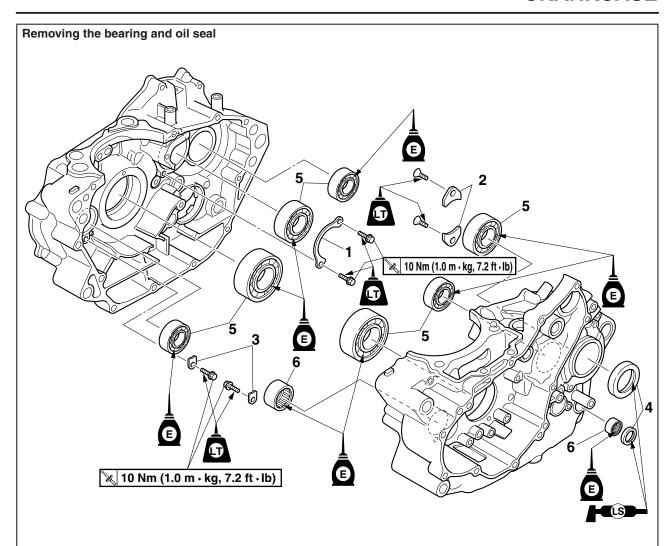
- Tighten bolts in a crisscross pattern.
- Use copper washer for part "2" only.



#### **CRANKCASE**







| Order | Job/Parts to remove   | Q'ty | Remarks   |
|-------|-----------------------|------|---|
|       | Crankshaft assembly   |      | Refer to "CRANKSHAFT ASSEMBLY AND BALANCER SHAFT" on page 5-61. |
|       | Transmission assembly |      | Refer to "TRANSMISSION" on page 5-64.                           |
| 1     | Bearing cover plate   | 1    |   |
| 2     | Bearing cover plate   | 2    |   |
| 3     | Stopper plate         | 2    |   |
| 4     | Oil seal              | 2    |   |
| 5     | Bearing               | 7    |   |
| 6     | Needle bearing        | 2    |   |
|       |                       |      | For installation, reverse the removal procedure.                |

#### **DISASSEMBLING THE CRANKCASE**

- 1. Remove:
- Crankcase bolts

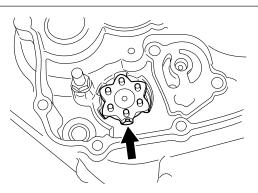
NOTE: \_

Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.

- 2. Turn:
- Shift drum segment

NOTE:

Turn the shift drum segment to the position shown in the illustration. In this position, the shift drum segment's teeth will not contact the crankcase during crankcase separation.



- 3. Remove:
- Right crankcase

ECA13910

#### **CAUTION:**

- First check that the shift drum segment's teeth and the drive axle circlip are properly positioned, then remove the right crankcase.
- Do not damage the crankcase mating surfaces.

EAS32D1015

# CHECKING THE TIMING CHAIN, TIMING CHAIN GUIDE, OIL STRAINER, NOZZLE, DELIVERY PIPE

- 1. Check:
- Timing chain
   Stiffness → Replace the camshaft sprocket,
   timing chain and crankshaft sprocket as a
   set.
- 2. Check:
- Timing chain guide
   Damage/wear → Replace.
- 3. Check:
- Oil strainer

Obstruction  $\to$  Blow out with compressed air. Cracks/damage  $\to$  Replace.

- 4. Check:
  - Nozzle
  - Delivery pipe
     Obstruction → Blow out with compressed air.
     Bends/cracks/damage → Replace.



EAS25580

#### CHECKING THE CRANKCASE

- Thoroughly wash the crankcase halves in a mild solvent.
- 2. Thoroughly clean all the gasket surfaces and crankcase mating surfaces.
- 3. Check:
  - $\begin{array}{l} \bullet \; \text{Crankcase} \\ \text{Cracks/damage} \to \text{Replace}. \end{array}$
  - Oil delivery passages
     Obstruction → Blow out with compressed air.

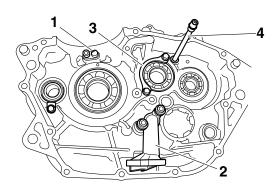
EAS25700

#### **ASSEMBLING THE CRANKCASE**

- 1. Install:
- Nozzle "1"
- Oil strainer "2"
- Bearing cover plate "3"
- Oil delivery pipe "4"



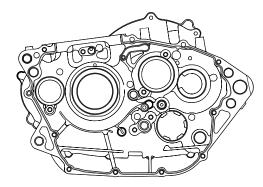
Nozzle bolt
10 Nm (1.0 m•kg, 7.2 ft•lb)
LOCTITE®
Oil delivery bolt
10 Nm (1.0 m•kg, 7.2 ft•lb)
LOCTITE®
Oil strainer bolt
10 Nm (1.0 m•kg, 7.2 ft•lb)
LOCTITE®
Bearing cover plate
10 Nm (1.0 m•kg, 7.2 ft•lb)
LOCTITE®



- 2. Thoroughly clean all the gasket mating surfaces and crankcase mating surfaces.
- 3. Apply:
  - Sealant (onto the crankcase mating surfaces)



Yamaha bond No. 1215 (Three Bond No.1215®) 90890-85505



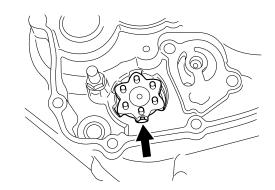
- 4. Install:
  - Crankcase (to the left crankcase)

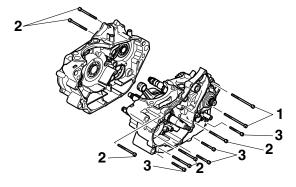


Crankcase bolt 10 Nm (1.0 m•kg, 7.2 ft•lb)

#### NOTE: \_

- Turn the shift drum segment as shown so that the shift drum segment teeth do not contact the crankcase during its assembling.
- Tighten the bolts in a crisscross pattern in two (2) stages, with 1/4 turn each.



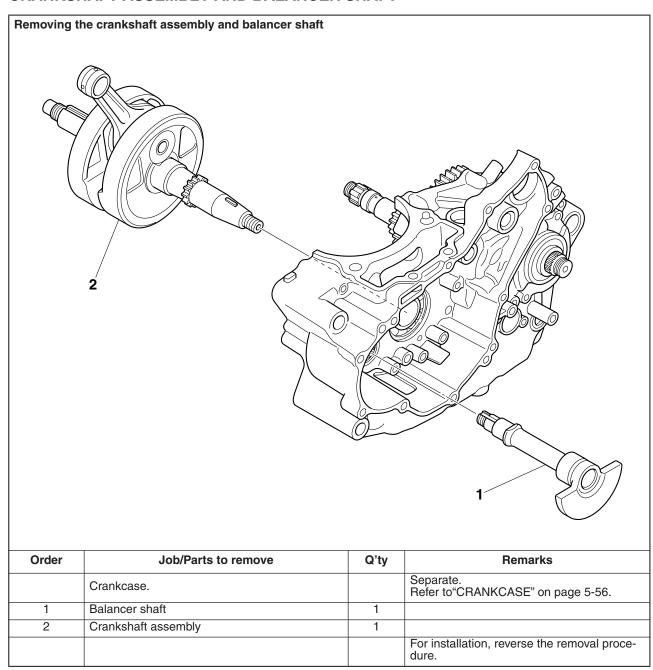


- 1.  $M6 \times 90 \text{ mm}$
- 2.  $M6 \times 65 \text{ mm}$
- 3.  $M6 \times 45 \text{ mm}$

## **CRANKSHAFT ASSEMBLY AND BALANCER SHAFT**

EAS25970

#### **CRANKSHAFT ASSEMBLY AND BALANCER SHAFT**



#### CRANKSHAFT ASSEMBLY AND BALANCER SHAFT

EAS26000

#### REMOVING THE CRANKSHAFT ASSEMBLY

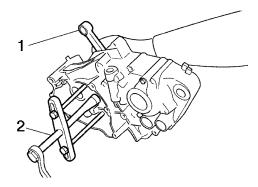
- 1. Remove:
- Crankshaft assembly "1"

NOTE: \_

• Remove the crankshaft assembly by using the crankcase separating tool "2".



Crankcase separating tool 90890-01135 Crankcase separator YU-01135-B



EAS26060

#### CHECKING THE CRANKSHAFT ASSEMBLY

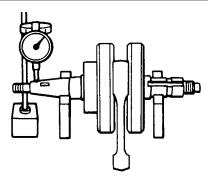
- 1. Measure:
- Crankshaft runout
   Out of specification → Replace the crankshaft, bearing or both.

NOTE:

Turn the crankshaft slowly.



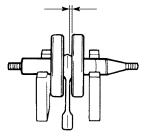
Runout limit C 0.030 mm (0.0012 in)



- 2. Measure:
- Big end side clearance
   Out of specification → Replace the big end bearing, crankshaft pin, or connecting rod.



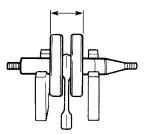
Big end side clearance D 0.350-0.650 mm (0.0138-0.0256 in)



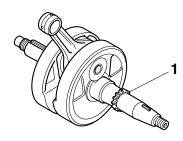
- 3. Measure:
  - Crankshaft width
     Out of specification → Replace the crankshaft.



Width A 61.95–62.00 mm (2.439–2.441 in)



- 4. Check:
- Crankshaft sprocket "1"
   Damage → Replace the crankshaft.



- 5. Check:
- Crankshaft journal oil passage
   Obstruction → Blow out with compressed air.

EAS26210

## INSTALLING THE CRANKSHAFT ASSEMBLY

- 1. Install:
- Crankshaft assembly

NOTE:

Install the crankshaft assembly with the crankshaft installer pot "1", crankshaft installer bolt

#### CRANKSHAFT ASSEMBLY AND BALANCER SHAFT

"2", adapter (M12) "3" and spacer "4".



Crankshaft installer pot "1" 90890-01274 Installing pot YU-90058 Crankshaft installer bolt "2" 90890-01275 Bolt YU-90060 Adapter (M12) "3" 90890-01278 Adapter #3 YU-90063 Spacer (crankshaft installer) "4" 90890-04081 Pot spacer YM-91044

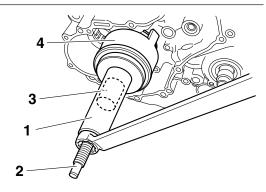
ECA13970

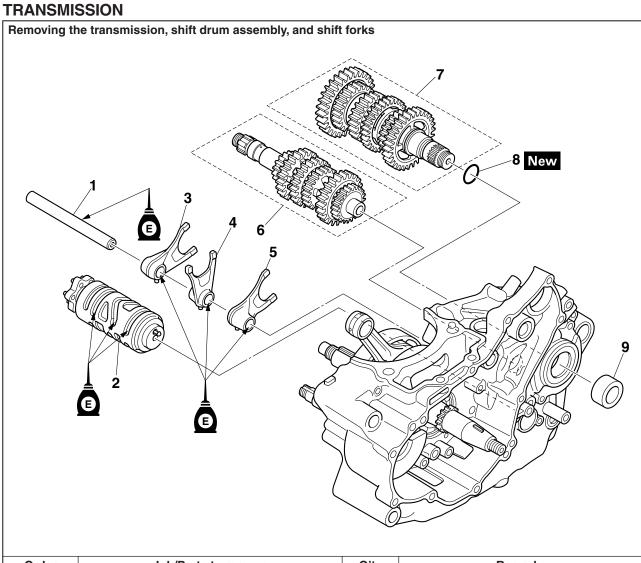
#### **CAUTION:**

To avoid scratching the crankshaft and to ease the installation procedure, lubricate the oil seal lips with lithium-soap-based grease and each bearing with engine oil.

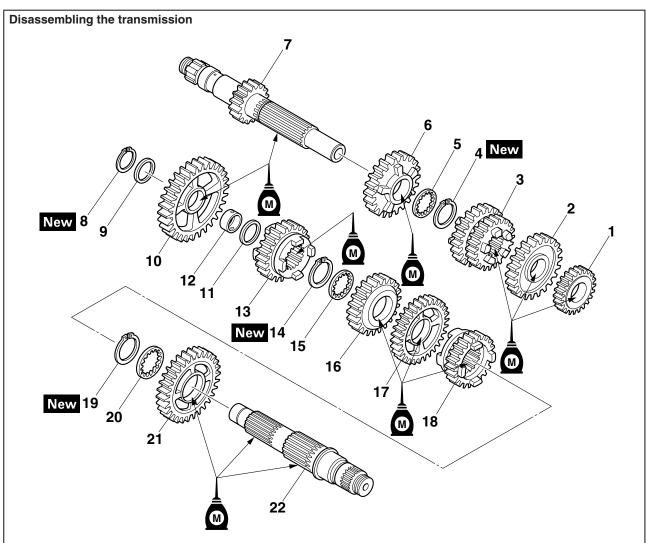
#### NOTE:

Hold the connecting rod at top dead center (TDC) with one hand while turning the nut of the crankshaft installer bolt with the other. Turn the crankshaft installer bolt until the crankshaft assembly bottoms against the bearing.

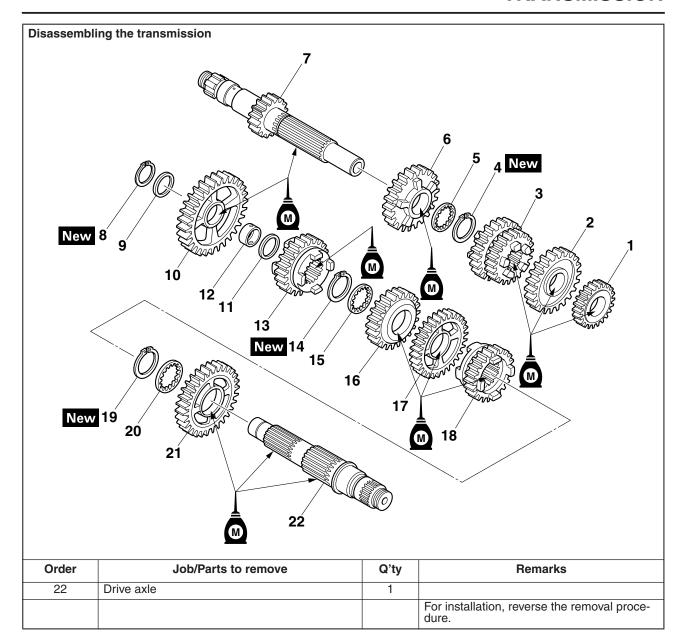




| Order | Job/Parts to remove  | Q'ty | Remarks  |
|-------|----------------------|------|--|
|       | Crankcase            |      | Separate. Refer to"CRANKCASE" on page 5-56.      |
| 1     | Shift fork guide bar | 1    |  |
| 2     | Shift drum           | 1    |  |
| 3     | Shift fork-R         | 1    |  |
| 4     | Shift fork-C         | 1    |  |
| 5     | Shift fork-L         | 1    |  |
| 6     | Main axle assembly   | 1    |  |
| 7     | Drive axle assembly  | 1    |  |
| 8     | O-ring               | 1    |  |
| 9     | Collar               | 1    |  |
|       |                      |      | For installation, reverse the removal procedure. |



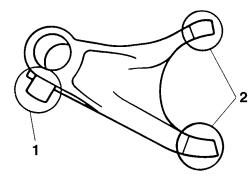
| Order | Job/Parts to remove | Q'ty | Remarks |
|-------|---------------------|------|---------|
| 1     | 2nd pinion gear     | 1    |         |
| 2     | 6th pinion gear     | 1    |         |
| 3     | 3rd pinion gear     | 1    |         |
| 4     | Circlip             | 1    |         |
| 5     | Washer              | 1    |         |
| 6     | 5th pinion gear     | 1    |         |
| 7     | Main axle           | 1    |         |
| 8     | Circlip             | 1    |         |
| 9     | Plain washer        | 1    |         |
| 10    | 1st wheel gear      | 1    |         |
| 11    | Washer              | 1    |         |
| 12    | Collar              | 1    |         |
| 13    | 5th wheel gear      | 1    |         |
| 14    | Circlip             | 1    |         |
| 15    | Washer              | 1    |         |
| 16    | 4th wheel gear      | 1    |         |
| 17    | 3rd wheel gear      | 1    |         |
| 18    | 6th wheel gear      | 1    |         |
| 19    | Circlip             | 1    |         |
| 20    | Washer              | 1    |         |
| 21    | 2nd wheel gear      | 1    |         |



#### **CHECKING THE SHIFT FORKS**

The following procedure applies to all of the shift forks.

- 1. Check:
- Shift fork pawl "2" Bends/damage/scoring/wear → Replace the shift fork.
- Shift fork cam follower "1"



#### 2. Check:

• Shift fork guide bar Roll the shift fork guide bar on a flat surface. Bends  $\rightarrow$  Replace.

#### **WARNING**

Do not attempt to straighten a bent shift fork guide bar.

#### 3. Check:

 Shift fork movement (along the shift fork guide bar) Rough movement → Replace the shift forks and shift fork guide bar as a set.

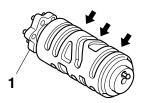


319-011

FAS26270

#### CHECKING THE SHIFT DRUM ASSEMBLY

- 1. Check:
- Shift drum groove Damage/scratches/wear → Replace the shift drum assembly.
- Shift drum segment "1" Damage/wear → Replace the shift drum assembly.
- Shift drum bearing Damage/pitting → Replace the shift drum as-



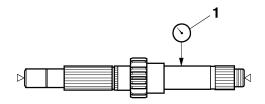
EAS26290

#### CHECKING THE TRANSMISSION

- 1. Measure:
  - Main axle runout (with a centering device and dial gauge "1") Out of specification  $\rightarrow$  Replace the main axle.



Main axle runout limit 0.08 mm (0.0032 in)

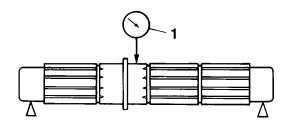


#### 2. Measure:

 Drive axle runout (with a centering device and dial gauge "1")
 Out of specification → Replace the drive axle.



Drive axle runout limit 0.08 mm (0.0032 in)



#### 3. Check:

- Transmission gears
   Blue discoloration/pitting/wear → Replace the defective gear (s).
- Transmission gear dogs
   Cracks/damage/rounded edges → Replace the defective gear (s).

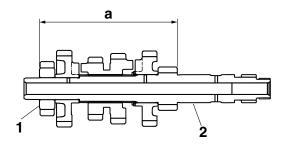
#### 4. Check:

 Transmission gear engagement (each pinion gear to its respective wheel gear)

Incorrect  $\rightarrow$  Reassemble the transmission axle assemblies.

#### NOTE:

When reassembling the main axle, press the 2nd pinion gear "1" onto it "2" as shown.



a. 107.4-107.6 mm (4.228-4.236 in)

#### 5. Check:

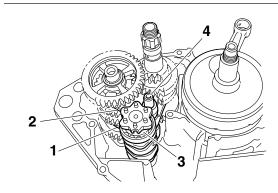
 Transmission gear movement Rough movement → Replace the defective part (s). EAS26320

## INSTALLING THE SHIFT FORKS AND SHIFT DRUM ASSEMBLY

- 1. Install:
- Shift fork guide bar "1"
- Shift fork-R "2"
- Shift fork-C "3"
- Shift fork-L "4"

#### NOTE:

The embossed marks on the shift forks should face towards the clutch side of the engine and be in the following sequence: "R", "C", "L".

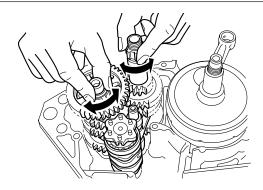


#### **INSTALLING THE TRANSMISSION**

- 1. Install:
- Transmission
- 2. Check:
  - $\begin{array}{l} \bullet \mbox{ Transmission} \\ \mbox{ Rough movement} \to \mbox{ Repair.} \end{array}$

NOTE: \_

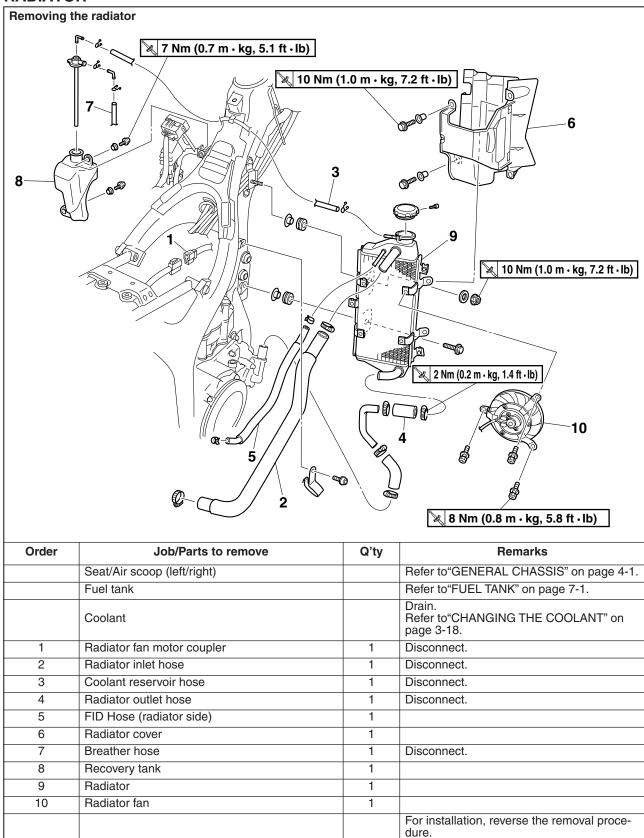
Oil each gear, shaft, and bearing thoroughly.



## COOLING SYSTEM

| RADIATOR                           | 6-1 |
|------------------------------------|-----|
| CHECKING THE RADIATOR              | 6-2 |
| INSTALLING THE RADIATOR            | 6-2 |
| THERMOSTAT                         | 6-4 |
| CHECKING THE THERMOSTAT            |     |
| INSTALLING THE THERMOSTAT ASSEMBLY |     |
| WATER PUMP                         | 6-6 |
| CHECKING THE WATER PUMP            | 6-7 |
| ASSEMBLING THE WATER PUMP          | 6-7 |

#### **RADIATOR**



#### CHECKING THE RADIATOR

- 1. Check:
- Radiator fins "1"

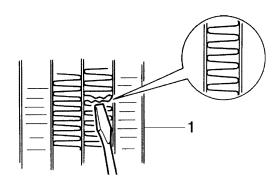
Obstruction  $\rightarrow$  Clean.

Apply compressed air to the rear of the radiator.

Damage  $\rightarrow$  Repair or replace.

#### NOTE:

Straighten any flattened fins with a thin, flat-head screwdriver.



- 2. Check:
  - Radiator hoses (IN/OUT)
- Radiator pipes
   Cracks/damage → Replace.
- 3. Measure:
  - Radiator cap opening pressure
     Below the specified pressure → Replace the radiator cap.



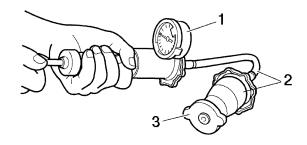
Radiator cap opening pressure 108.0–137.4 kPa (15.7–19.9 psi) (1.08–1.37 kgf/cm<sup>2</sup>)

a. Install the radiator cap tester "1" and radiator cap tester adapter "2" to the radiator cap "3".

\*



Radiator cap tester 90890-01325 Radiator pressure tester YU-24460-01 Radiator cap tester adapter 90890-01352 Radiator pressure tester adapter YU-33984



I4110202

b. Apply the specified pressure for ten seconds and make sure there is no drop in pressure.

#### 4. Check:

Radiator fan
 Damage → Replace.
 Malfunction → Check and repair.
 Refer to "COOLING SYSTEM" on page 8-25.

EAS26400

#### **INSTALLING THE RADIATOR**

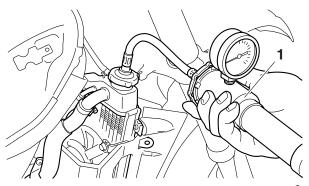
- 1. Fill:
- Cooling system (with the specified amount of the recommended coolant)
   Refer to "CHANGING THE COOLANT" on page 3-18.
- 2. Check:
  - Cooling system
     Leakage → Collect or replace.
- a. Attach the radiator cap tester "1" to the radiator.

Radiator cap tester

\*



90890-01325
Radiator pressure tester
YU-24460-01
Radiator cap tester adapter
90890-01352
Radiator pressure tester adapter
YU-33984



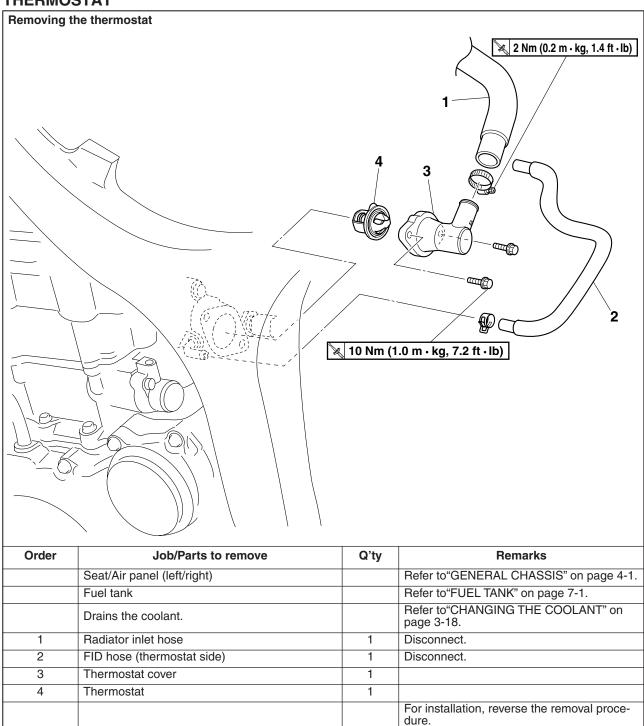
- b. Apply the 100 kPa (14.22 psi) (1.0 kg/cm<sup>2</sup>) pressure.
- c. Measure the indicated pressure with the gauge.

#### 

- 3. Measure:
- $\bullet$  Radiator cap opening pressure Below the specified pressure  $\to$  Replace the radiator cap.

Refer to "CHECKING THE RADIATOR" on page 6-2.

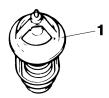
#### **THERMOSTAT**



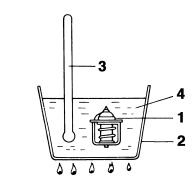
#### **CHECKING THE THERMOSTAT**

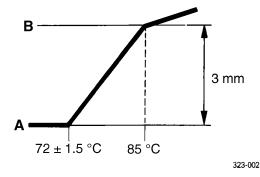
- 1. Check:
- Thermostat "1"

Does not open at  $70.5-73.5^{\circ}$ C (158.9–164.3°F)  $\rightarrow$  Replace.



- a. Suspend the thermostat "1" in a container "2" filled with water.
- b. Slowly heat the water.
- c. Place a thermometer "3" in the water "4".
- d. While stirring the water, observe the thermostat and thermometer's indicated temperature.





A. Fully closed

NOTE:

If the accuracy of the thermostat is in doubt, replace it. A faulty thermostat could cause serious overheating or overcooling.

#### 

- 2. Check:
- Thermostat housing cover Cracks/damage → Replace.

EAS2648

## INSTALLING THE THERMOSTAT ASSEMBLY

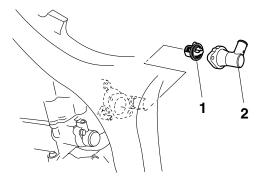
- 1. Install:
- Thermostat "1"
- Thermostat cover "2"

NOTF:

Install the thermostat by facing breather hole upward.



Thermostat cover bolt 10 Nm (1.0 m•kg, 7.2 ft•lb)



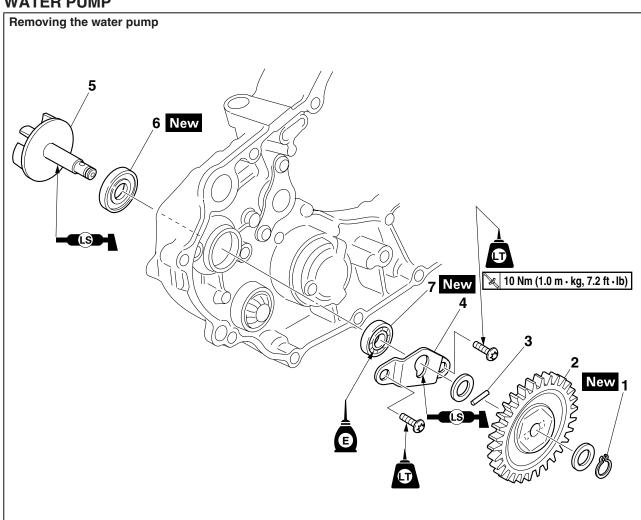
- 2. Fill:
- Cooling system

   (with the specified amount of the recommended coolant)

   Refer to "CHANGING THE COOLANT" on page 3-18.
- 3. Check:
- Cooling system
   Leaks → Repair or replace any faulty part.
- 4. Measure:
  - Radiator cap opening pressure
     Below the specified pressure → Replace the
     radiator cap.

Refer to "CHECKING THE RADIATOR" on page 6-2.

#### **WATER PUMP**



| Order | Job/Parts to remove      | Q'ty | Remarks  |
|-------|--------------------------|------|--|
|       | Drains the coolant.      |      | Refer to "CHANGING THE COOLANT" on page 3-18.    |
|       | Drains the engine oil    |      | Refer to "CHANGING THE ENGINE OIL" on page 3-11. |
|       | Water pump housing cover |      | Refer to "CLUTCH" on page 5-34.                  |
|       | Crank case cover light   |      | Refer to "CLUTCH" on page 5-34.                  |
| 1     | Circlips                 | 1    |  |
| 2     | Impeller shaft gear      | 1    |  |
| 3     | Dowelpin                 | 1    |  |
| 4     | Plate                    | 1    |  |
| 5     | Impeller shaft           | 1    |  |
| 6     | Mechanical seal          | 1    |  |
| 7     | Bearing                  | 1    |  |
|       |                          |      | For installation, reverse the removal procedure. |

#### **CHECKING THE WATER PUMP**

- 1. Check:
- Water pump housing cover
- Impeller shaft
- Plate

Cracks/damage/wear  $\rightarrow$  Replace.

- 2. Check:
  - Impeller shaft gear
     Cracks/damage/chips → Replace.

FAS26560

#### **ASSEMBLING THE WATER PUMP**

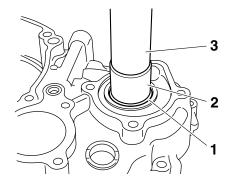
- 1. Install:
- Bearing New
- Mechanical "1" New (to the right crankcase cover)

NOTE:

- Install the mechanical seal by facing stamp world "WATER SIDE" to the impeller housing cover.
- Install the mechanical seal by using mechanical seal installer "2" and middle driven shaft bearing driver "3".



Mechanical seal installer 90890-04145 Middle driven shaft bearing driver 90890-04058



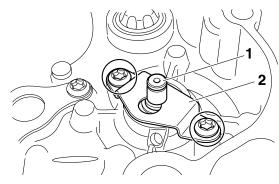
- 2. Lubricate:
  - Mechanical seal lip
  - Impeller shaft
- 3. Install:
- Impeller shaft "1"
- Plate "2"

NOTE:

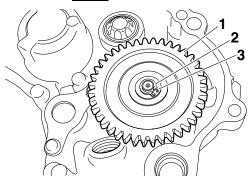
Tighten the plate bolt with appling the LOCTITE®.



Plate bolt 10 Nm (1.0 m•kg, 7.2 ft•lb)



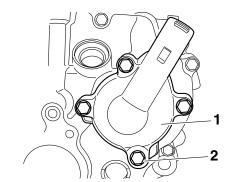
- 4. Lubricate:
  - Engine oil (to the bearing)
- 5. Install:
- Plate washer
- Dowel pin
- Impeller shaft gear "1"
- Plate washer "2"
- Circlip "3" New



- 6. Install:
  - Crankcase cover right gascket New
  - Crankcase cover (right)
    Refer to "CLUTCH" on page 5-34.
- 7. Install:
- Water pump housing cover gascket New
- Water pump housing cover "1" (Bolt "2" with new copper washer)



Water pump housing cover bolt 10 Nm (1.0 m•kg, 7.2 ft•lb)



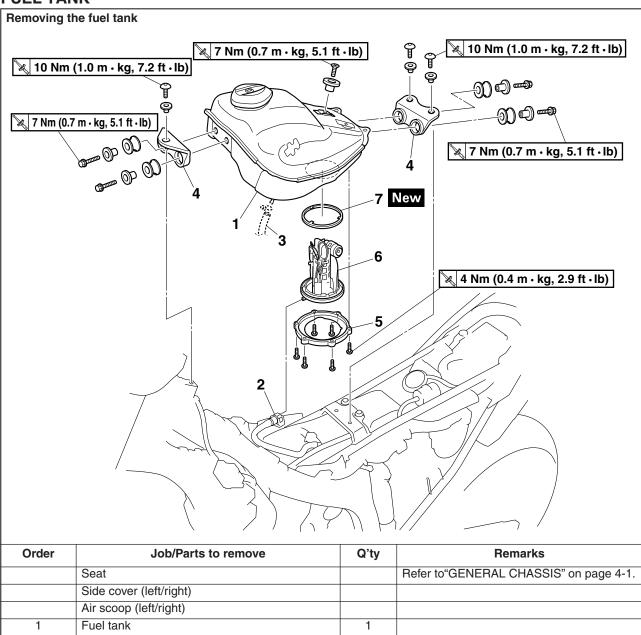
8. Fill:

- Crankcase Refer to "CHANGING THE ENGINE OIL" on page 3-11.
- 9. Fill:
  - Cooling system Refer to "CHANGING THE COOLANT" on page 3-18.

## **FUEL SYSTEM**

| FUEL TANK                                 | 7-1  |
|---|------|
| REMOVING THE FUEL TANK                    | 7-2  |
| REMOVING THE FUEL PUMP                    | 7-2  |
| INSTALLING THE FUEL PUMP                  |      |
| INSTALLING THE FUEL TANK                  | 7-2  |
| THROTTLE BODIES                           | 7-4  |
| CHECKING THE INJECTORS                    |      |
| CHECKING THE THROTTLE BODIES              | 7-6  |
| CHECKING THE PRESSURE REGULATOR           | 7-6  |
| CHECKING THE PRESSURE REGULATOR OPERATION | 7-6  |
| ADJUSTING THE THROTTLE POSITION SENSOR    | 7-7  |
| AIR INDUCTION SYSTEM                      |      |
| CHECKING THE AIR INDUCTION SYSTEM         |      |
| CANISTER (FOR CALIFORNIA)                 | 7-13 |

### **FUEL TANK**



| Order | Job/Parts to remove              | Q'ty | Remarks   |
|-------|----------------------------------|------|---|
|       | Seat                             |      | Refer to "GENERAL CHASSIS" on page 4-1.         |
|       | Side cover (left/right)          |      |   |
|       | Air scoop (left/right)           |      |   |
| 1     | Fuel tank                        | 1    |   |
| 2     | Fuel hose coupler                | 1    | Disconnect.                                     |
| 3     | Hose (fuel tank-roll over valve) | 1    | Disconnect (for California)                     |
| 4     | Fuel tank bracket (front/rear)   | 1/1  |   |
| 5     | Fuel pump bracket                | 1    |   |
| 6     | Fuel pump assembly               | 1    |   |
| 7     | O-ring                           | 1    |   |
|       |                                  |      | For installation, reverse the removal procedure |

### **REMOVING THE FUEL TANK**

- 1. Extract the fuel in the fuel tank through the fuel tank cap with a pump.
- 2. Remove:
  - Fuel hose coupler

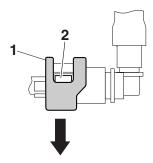
ECA14700

### **CAUTION:**

Although the fuel has been removed from the fuel tank be careful when removing the fuel hoses, since there may be fuel remaining in it.

#### NOTE:

- Slide the fuel hose connector cover "1" in the direction of the arrow mark, and press the buttons "2" on both sides of the connector to remove the fuel hose.
- Disconnecting the hose is done by hand.
   There is no need to use tools.
- Before removing the fuel hose, place a few rags in the area under where it will be removed.



- 3. Remove:
  - Fuel tank

### NOTE: \_

Do not set the fuel tank down so that the installation surface of the fuel pump is directly under the tank. Be sure to lean the fuel tank in an upright position.

EAS26640

### REMOVING THE FUEL PUMP

- 1. Remove:
- Fuel pump

ECA14720

### **CAUTION:**

- Do not drop the fuel pump or give it a strong shock.
- Do not touch the base section of the fuel sender.

EAS26700

### **INSTALLING THE FUEL PUMP**

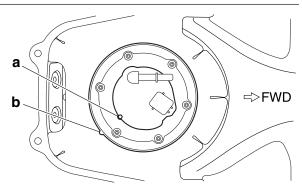
- 1. Install:
- Fuel pump



Fuel pump bolts 4 Nm (0.4 m•kg, 2.9 ft•lb)

#### NOTE:

- Do not damage the installation surfaces of the fuel tank when installing the fuel pump.
- Always use a new fuel pump gasket.
- Install the fuel pump as shown in the illustration.
- Align the projection "a" on the fuel pump with the slot in the fuel pump bracket.
- Align the slot "b" on the fuel tank damper with the projection "a" on the fuel pump.
- Tighten the fuel pump bolts in stages in a crisscross pattern.



FAS32D1016

#### INSTALLING THE FUEL TANK

- 1. Install:
- Fuel hose
- Fuel return hose

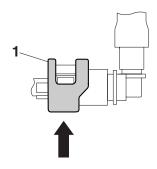
ECA14740

### **CAUTION:**

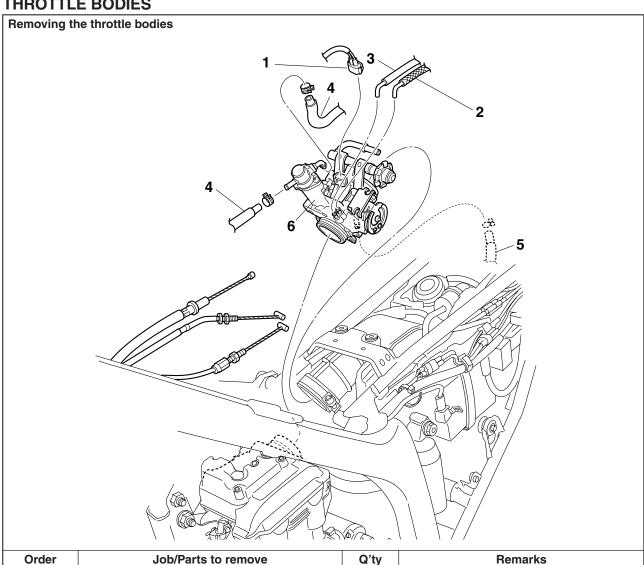
When installing the fuel hose, make sure that it is securely connected, and that the fuel hose holders are in the correct position, otherwise the fuel hose will not be properly installed.

#### NOTE:

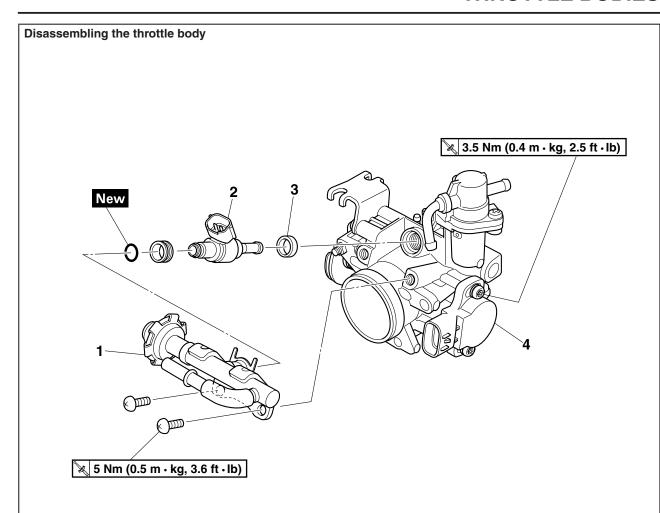
- Insert the fuel hose on the fuel pipe until you hear a definite "click".
- Slide the fuel hose connector cover "1" at the fuel hose end in the direction of the arrow.



## **THROTTLE BODIES**



| Order | Job/Parts to remove                      | Q'ty | Remarks  |
|-------|--|------|--|
|       | Seat                                     |      | Refer to "GENERAL CHASSIS" on page 4-1.              |
|       | Side cover (left/right)                  |      |  |
|       | Air scoop (left/right)                   |      |  |
|       | Fuel tank                                |      | Refer to "FUEL TANK" on page 7-1.                    |
|       | Throttle cable                           |      | Refer to "CAMSHAFT" on page 5-6.                     |
|       | Clutch cable                             |      |  |
|       | Coolant                                  |      | Drain. Refer to "CHANGING THE COOLANT" on page 3-18. |
|       | Ignition coil lead                       |      | Refer to "CAMSHAFT" on page 5-6.                     |
| 1     | Injector coupler                         | 1    | Disconnect.  |
| 2     | Vacuum hose                              | 1    |  |
| 3     | ITS boost hose                           | 1    |  |
| 4     | FID hose (Thermostat side/radiator side) | 2    |  |
| 5     | Hose (canister-throttle body)            | 1    | (for California)                                     |
| 6     | Throttle bodies assembly                 | 1    |  |
|       |  |      | For installation, reverse the removal procedure.     |



| Order | Job/Parts to remove      | Q'ty | Remarks  |
|-------|--------------------------|------|--|
| 1     | Delivery pipe            | 1    |  |
| 2     | Injector                 | 1    |  |
| 3     | Gasket                   | 1    |  |
| 4     | Throttle position sensor | 1    |  |
|       |                          |      | For installation, reverse the removal procedure. |

FAS26980

### **CHECKING THE INJECTORS**

EWA32D1009

## **MARNING**

Replace the fuel injector with a new one if you have dropped or impacted it.

- 1. Check:
- Injectors
   Damage → Replace.

EAS26990

### **CHECKING THE THROTTLE BODIES**

- 1. Check:
- 2. Check:
- Fuel passages
   Obstructions → Clean.

\*\*\*\*\*\*\*

 a. Wash the throttle bodies in a petroleumbased solvent.

Do not use any caustic carburetor cleaning solution.

b. Blow out all of the passages with compressed air.

EAS27000

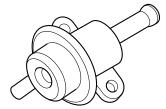
#### CHECKING THE PRESSURE REGULATOR

EWA32D1010

## **MARNING**

Replace the pressure regulator with a new one if you have dropped or impacted it.

- 1. Check:
- Pressure regulator
   Damage → Replace.



FAS2701

# CHECKING THE PRESSURE REGULATOR OPERATION

- 1. Check:
- Pressure regulator operation

a. Remove the fuel tank.
 Refer to "FUEL TANK" on page 7-1.

b. Connect the pressure gauge "1" and adapter "2" to the fuel injection pipe.

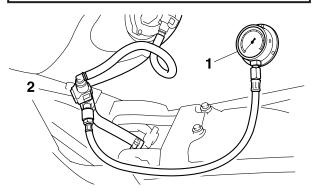
\*



Vacuum/pressure pump gauge set 90890-06756 Mityvac brake bleeding tool YS-42423

Pressure gauge 90890-03153 YU-03153 Fuel pressure adapter 90890-03176

YM-03176



- c. Install the fuel tank.

  Refer to "FUEL TANK" on page 7-1.
- d. Start the engine.
- e. Measure the fuel pressure.



Fuel pressure 250 kPa (35.6 psi) (2.50 kg/cm<sup>2</sup>)

f. Use the vacuum/pressure pump gauge set to adjust the fuel pressure in relation to the vacuum pressure as described below.

#### NOTE:

The vacuum pressure should not exceed 100 kPa (14.2 psi) (1.00 kg/cm<sup>2</sup>).

Increase the vacuum pressure  $\rightarrow$  Fuel pressure is decreased Decrease the vacuum pressure  $\rightarrow$  Fuel pressure is increased

Faulty  $\rightarrow$  Replace the pressure regulator.

# ADJUSTING THE THROTTLE POSITION SENSOR

EWA32D1011

## **⚠** WARNING

Replace the throttle position sensor with a new one if you have dropped or impacted it.

### NOTE:

Before adjusting the throttle position sensor, the engine idling speed should be properly adjusted.

- 1. Check:
- Throttle position sensor Refer to "CHECKING THE THROTTLE PO-SITION SENSOR" on page 8-79.
- 2. Adjust:
  - Throttle position sensor angle

\*\*\*\*\*\*\*\*\*

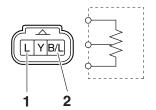
a. Connect the throttle position sensor coupler to the wire harness.

b. Connect the digital circuit tester to the throttle position sensor.

Positive tester probe Blue "1" Negative tester probe Black/Blue "2"



Digital circuit tester 90890-03174 Model 88 Multimeter with tachometer YU-A1927



- c. Measure the throttle position sensor voltage.
- d. Adjust the throttle position sensor angle so that the voltage is within the specified range.



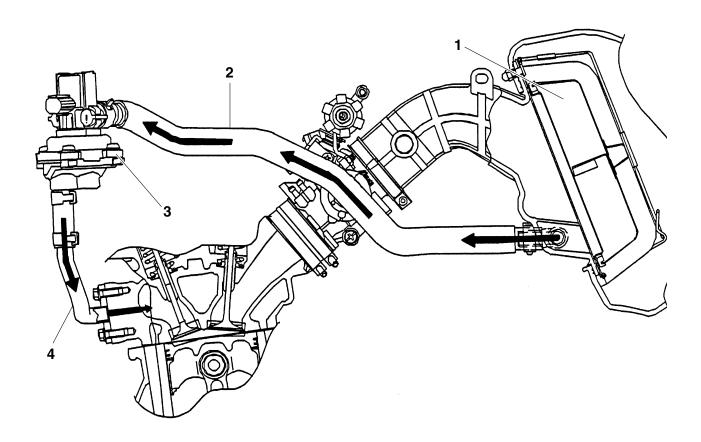
Throttle position sensor
Output voltage (when the engine is idling)
0.63–0.73 V

e. After adjusting the throttle position sensor an-

gle, tighten the throttle position sensor screws.

## **THROTTLE BODIES**

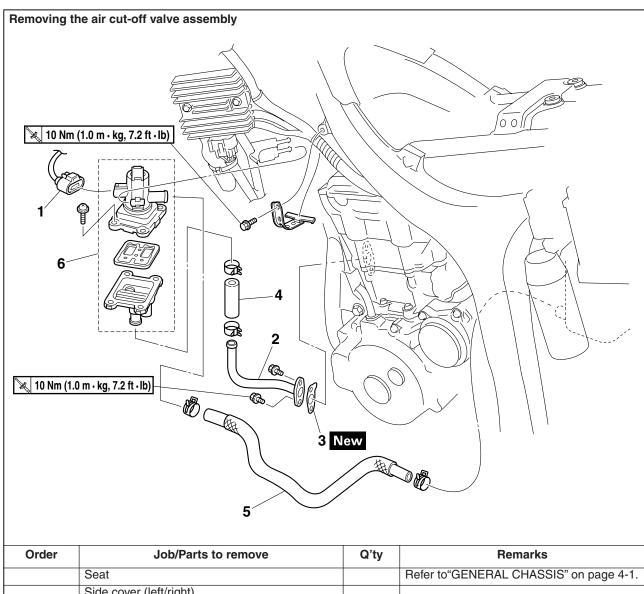
## **AIR INDUCTION SYSTEM**



## **AIR INDUCTION SYSTEM**

- 1. Air filter case
- 2. Air induction system hose
- 3. Air cut-off valve
- 4. Air induction system pipe

## **AIR INDUCTION SYSTEM**



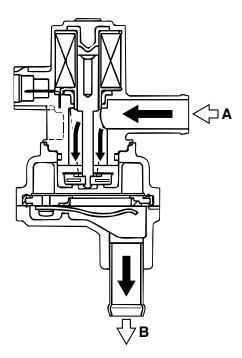
| Order | Job/Parts to remove        | Q'ty | Remarks  |
|-------|----------------------------|------|--|
|       | Seat                       |      | Refer to "GENERAL CHASSIS" on page 4-1.          |
|       | Side cover (left/right)    |      |  |
|       | Air scoop (left/right)     |      |  |
|       | Fuel tank                  |      | Refer to "FUEL TANK" on page 7-1.                |
| 1     | Air induction coupler      | 1    | Disconnect.                                      |
| 2     | Air induction system pipe  | 1    |  |
| 3     | Gasket                     | 1    |  |
| 4     | Pipe3                      | 1    |  |
| 5     | Air induction system hose  | 1    |  |
| 6     | Air cut-off valve assembly | 1    |  |
|       |                            |      | For installation, reverse the removal procedure. |

# CHECKING THE AIR INDUCTION SYSTEM Air induction

The air induction system burns unburned exhaust gases by injecting fresh air (secondary air) into the exhaust port, reducing the emission of hydrocarbons. When there is negative pressure at the exhaust port, the reed valve opens, allowing secondary air to flow into the exhaust port. The required temperature for burning the unburned exhaust gases is approximately 600 to 700°C.

### Air cut-off valve

The air cut-off valve is controlled by the signals from the ECU in accordance with the combustion conditions. Ordinarily, the air cut-off valve opens to allow the air to flow during idle and closes to cut-off the flow when the vehicle is being driven.



- A. From the air filter B. To the cylinder head
- 1. Check:
- Hoses

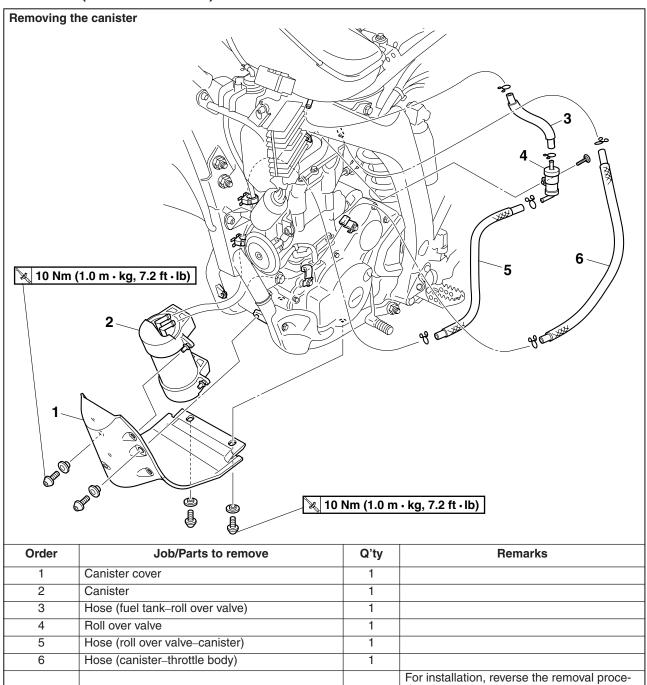
 $\label{eq:connections} \begin{tabular}{ll} \$ 

- Pipes
   Cracks/damage → Replace.
- 2. Check:
  - Reed valve
  - Reed valve stopper
  - Reed valve seat
     Cracks/damage → Replace the reed valve.

- 3. Check:
- Air cut-off valve
   Cracks/damage → Replace.

EAS32D12011

## **CANISTER (FOR CALIFORNIA)**



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| CHECKING THE IGNITION SPARK GAP  |               |
| OFFICIAL FIEL FORMER OF COMMISSION OF THE PROPERTY OF THE PROP | /-/           |

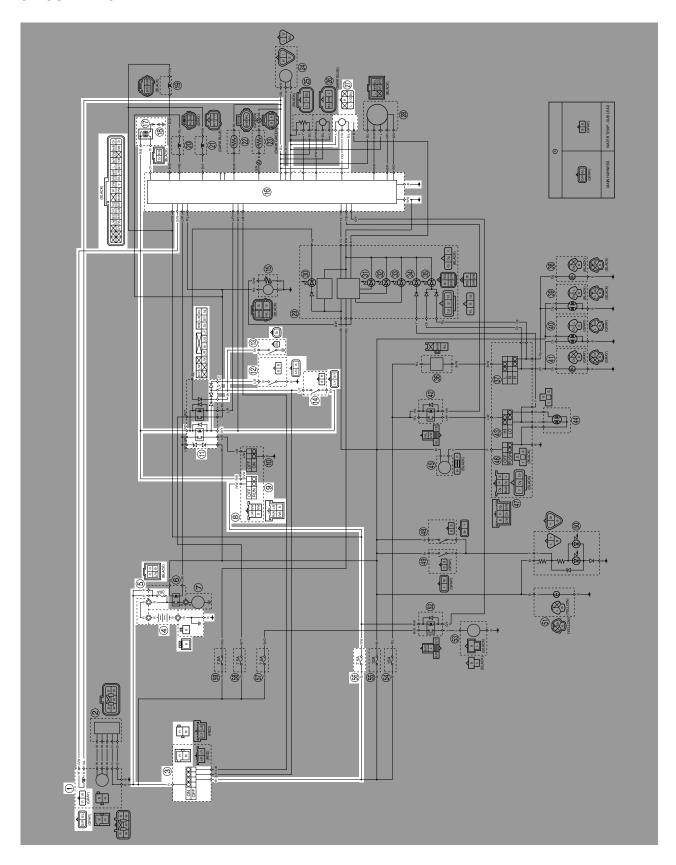
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### **IGNITION SYSTEM**

EAS27100

### **CIRCUIT DIAGRAM**



## **IGNITION SYSTEM**

- 1. AC magneto
- 3. Main switch
- 4. Battery
- 5. Main fuse
- 8. Right handlebar switch
- 9. Engine stop switch
- 11. Relay unit
- 12. Sidestand switch
- 13. Neutral switch
- 14. Clutch switch
- 16. ECU
- 17. Ignition coil
- 18. Spark plug
- 27. Lean angle sensor
- 56. Ignition fuse

FAS27130

### **TROUBLESHOOTING**

The ignition system fails to operate (no spark or intermittent spark).

#### NOTE

Before troubleshooting, remove the following part (s):

- 1. Seat
- 2. Side cover (left)
- 3. Air scoop (left/right)
- 4. Fuel tank

 Check the fuses. (Main and ignition) Refer to "CHECKING THE FUSES" on page 8-67.

 $NG \rightarrow$ 

Replace the fuse (s).

OK↓

 Check the battery.
 Refer to "CHECKING AND CHARG-ING THE BATTERY" on page 8-68.

 $NG \rightarrow$ 

•Clean the battery terminals.

Recharge or replace the battery.

OK↓

3. Check the spark plug.

Refer to "CHECKING THE SPARK PLUG" on page 3-8.

 $NG \rightarrow$ 

Re-gap or replace the spark plug.

OK↓

 Check the ignition spark gap.
 Refer to "CHECKING THE IGNITION SPARK GAP" on page 8-74.

 $\mathsf{OK} \!\! \to \!\!$ 

The ignition system is normal.

NG↓

 Check the ignition coil.
 Refer to "CHECKING THE IGNITION COIL" on page 8-74.

 $NG\!\!\to\!$ 

Replace the ignition coil.

OK↓

Check the crankshaft position sensor.
 Refer to "CHECKING THE CRANK-SHAFT POSITION SENSOR" on page 8-75.

 $NG \rightarrow$ 

Replace the stater assembly.

OK↓

7. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-63.

 $NG \rightarrow$ 

Replace the main switch.

OK↓

8. Check the engine stop switch. Refer to "CHECKING THE SWITCHES" on page 8-63.

 $NG \rightarrow$ 

Replace the right handlebar switch.

OK↓

Check the neutral switch. Refer to "CHECKING THE SWITCHES" on page 8-63.

 $NG \rightarrow$ 

Replace the neutral switch.

OK↓

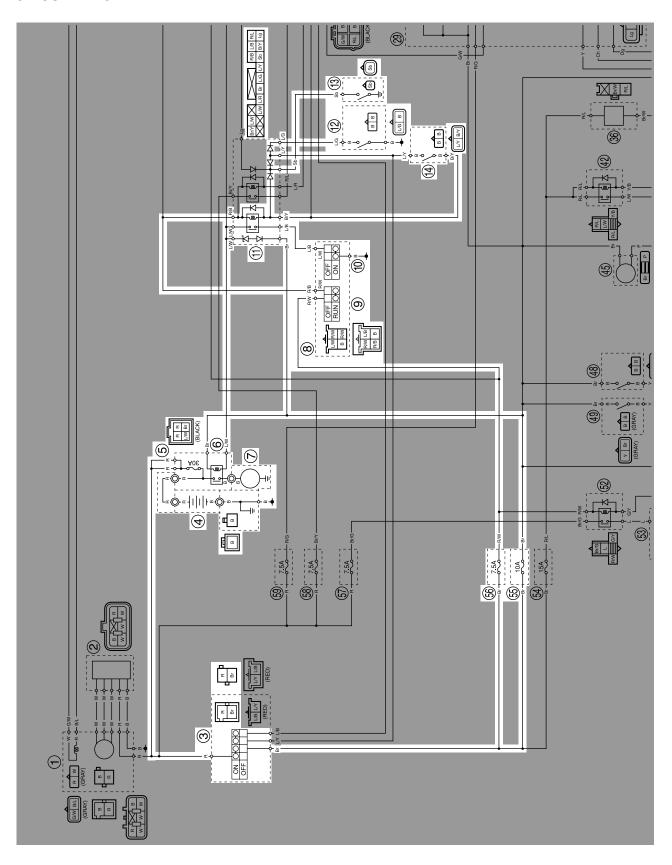
## **IGNITION SYSTEM**

10. Check the sidestand switch.  $NG \rightarrow$ Replace the sidestand switch. Refer to "CHECKING THE SWITCHES" on page 8-63. OK↓ 11. Check the clutch switch.  $NG \rightarrow$ Replace the clutch switch. Refer to "CHECKING THE SWITCHES" on page 8-63. OK↓ 12.Check the relay unit. Refer to "CHECKING THE RELAYS" Replace the relay unit.  $NG \rightarrow$ on page 8-71. OK↓ 13.Check the diode.  $NG \rightarrow$ Replace the relay unit. Refer to "CHECKING THE DIODE" on page 8-73. OK↓ 14. Check the lean angle sensor. Replace the lean angle sensor. Refer to "CHECKING THE LEAN  $NG \rightarrow$ ANGLE SENSOR" on page 8-75. OK↓ 15. Check the entire ignition system's Properly connect or repair the ignition  $NG \rightarrow$ Refer to "CIRCUIT DIAGRAM" on page system's wiring. 8-1. OK↓ Replace the ECU.

### **ELECTRIC STARTING SYSTEM**

EAS27170

### **CIRCUIT DIAGRAM**



## **ELECTRIC STARTING SYSTEM**

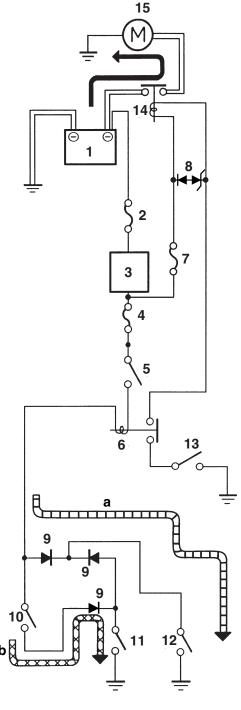
- 3. Main switch
- 4. Battery
- 5. Main fuse
- 6. Starter relay
- 7. Starter motor
- 8. Right handlebar switch
- 9. Engine stop switch
- 10. Start switch
- 11. Relay unit
- 12. Sidestand switch
- 13. Neutral switch
- 14. Clutch switch
- 55. Signaling system fuse
- 56. Ignition fuse

### STARTING CIRCUIT CUT-OFF SYSTEM OPERATION

If the engine stop switch is set to "\(\cap\)" and the main switch is set to "ON" (both switches are closed), the starter motor can only operate if at least one of the following conditions is met:

- The transmission is in neutral (the neutral switch is closed).
- The clutch lever is pulled to the handlebar (the clutch switch is closed) and the sidestand is up (the sidestand switch is closed).

The starting circuit cut-off relay prevents the starter motor from operating when neither of these conditions has been met. In this instance, the starting circuit cut-off relay is open so current cannot reach the starter motor. When at least one of the above conditions has been met the starting circuit cut-off relay is closed and the engine can be started by pressing the starter switch.



## **ELECTRIC STARTING SYSTEM**

- a. WHEN THE TRANSMISSION IS IN NEUTRAL
- b. WHEN THE SIDESTAND IS UP AND THE CLUTCH LEVER IS PULLED TO THE HANDLEBAR
- 1. Battery
- 2. Main fuse
- 3. Main switch
- 4. Ignition fuse
- 5. Engine stop switch
- 6. Starting circuit cut-off relay
- 7. Signal fuse
- 8. Diode
- 9. Diode
- 10. Clutch switch
- 11. Sidestand switch
- 12. Neutral switch
- 13. Start switch
- 14. Starter relay
- 15. Starter motor

ELECTRIC STARTING SYSTEM EAS27190 **TROUBLESHOOTING** The starter motor fails to turn. Before troubleshooting, remove the following part (s): 1. Seat 2. Side cover (left) 3. Air scoop (left/right) 4. Fuel tank 1. Check the fuses. (Main, ignition and signal fuse)  $NG \rightarrow$ Replace the fuse (s). Refer to "CHECKING THE FUSES" on page 8-67. OK↓ 2. Check the battery. Clean the battery terminals. Refer to "CHECKING AND CHARG- $NG \rightarrow$  Recharge or replace the battery. ING THE BATTERY" on page 8-68. OK↓ Replace the starter motor. Refer to "CHECKING THE STARTER  $NG \rightarrow$ Repair or replace the starter motor. MOTOR" on page 5-32. OK↓ 4. Check the relay unit. Refer to "CHECKING THE RELAYS"  $NG \rightarrow$ Replace the relay unit. on page 8-71. OK↓ 5. Check the diode. Refer to "CHECKING THE DIODE" on  $NG \rightarrow$ Replace the relay unit. page 8-73. OK↓ 6. Check the starter relay. Refer to "CHECKING THE RELAYS"  $NG \rightarrow$ Replace the starter relay. on page 8-71. OK↓ 7. Check the main switch. Refer to "CHECKING THE  $NG \rightarrow$ Replace the main switch. SWITCHES" on page 8-63. OK↓

8. Check the engine stop switch. Refer to "CHECKING THE SWITCHES" on page 8-63.

OK↓

Check the neutral switch. Refer to "CHECKING THE SWITCHES" on page 8-63.

OK↓

10.Check the sidestand switch. Refer to "CHECKING THE SWITCHES" on page 8-63.  $\text{NG}{\rightarrow}$ 

 $NG \rightarrow$ 

Replace the neutral switch.

Replace the right handlebar switch.

 $NG \rightarrow Replace$  the sidestand switch.

## **ELECTRIC STARTING SYSTEM**

 $\mathsf{OK}\!\!\downarrow$ 

11. Check the clutch switch. Refer to "CHECKING THE SWITCHES" on page 8-63.

NG→ Repla

Replace the clutch switch.

OK↓

12.Check the start switch. Refer to "CHECKING THE SWITCHES" on page 8-63.

 $\text{NG}{\rightarrow}$ 

Replace the right handlebar switch.

OK↓

13.Check the entire starting system's wiring.
Refer to "CIRCUIT DIAGRAM" on page 8-5.

 $NG \rightarrow$ 

Properly connect or repair the starting system's wiring.

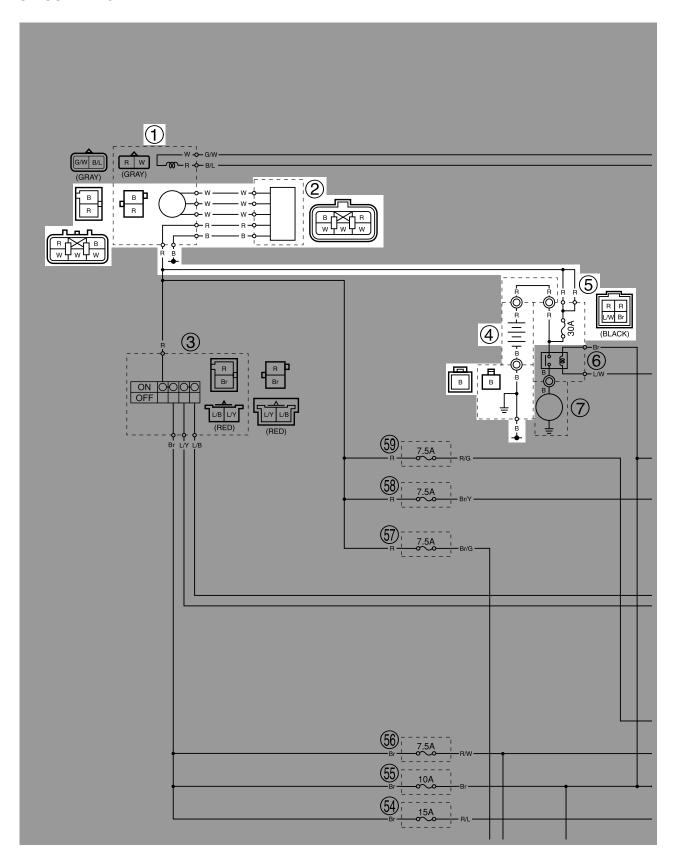
OK↓

The starting system circuit is OK.

### **CHARGING SYSTEM**

EAS27210

### **CIRCUIT DIAGRAM**



- 1. AC magneto
- 2. Rectifier/regulator
- 4. Battery
- 5. Main fuse

EAS27220 **TROUBLESHOOTING** The battery is not being charged. Before troubleshooting, remove the following part (s): 1. Seat 2. Side cover (left) 3. Air scoop (left) 1. Check the fuse. (Main)  $NG \rightarrow$ Replace the fuse. Refer to "CHECKING THE FUSES" on page 8-67. OK↓ 2. Check the battery. Clean the battery terminals.  $NG \rightarrow$ Refer to "CHECKING AND CHARG- Recharge or replace the battery. ING THE BATTERY" on page 8-68. OK↓ 3. Check the stator coil. Refer to "CHECKING THE STATOR  $NG \rightarrow$ Replace the stator assembly. COIL" on page 8-76. OK↓ 4. Check the rectifier/regulator. Refer to "CHECKING THE RECTI- $NG \rightarrow$ Replace the rectifier/regulator. FIER/REGULATOR" on page 8-76. OK↓ 5. Check the entire charging system's Properly connect or repair the charging

 $NG \rightarrow$ 

system's wiring.

OK↓

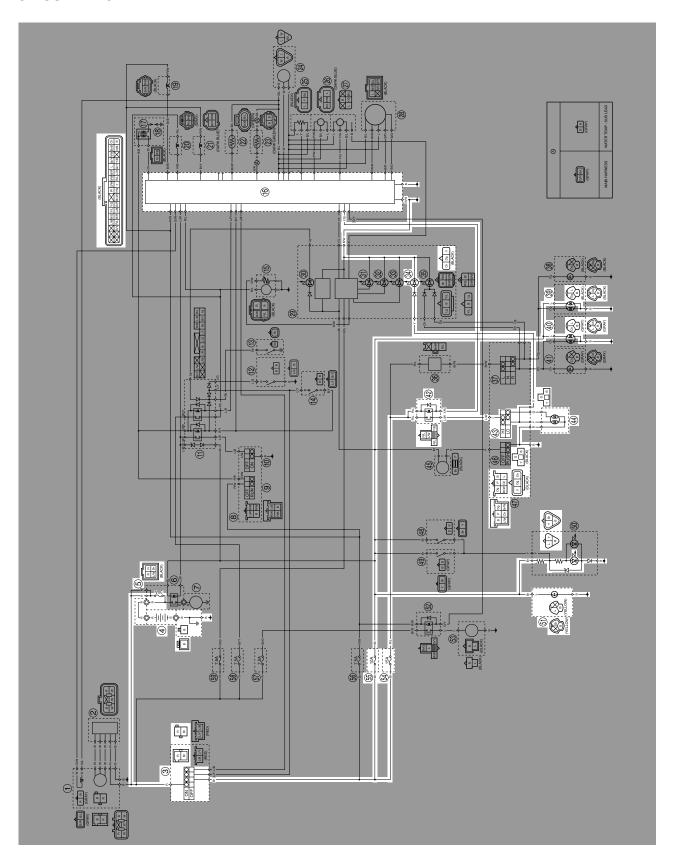
Refer to "CIRCUIT DIAGRAM" on page

This circuit is OK.

## **LIGHTING SYSTEM**

EAS27250

### **CIRCUIT DIAGRAM**



## **LIGHTING SYSTEM**

- 3. Main switch
- 4. Battery
- 5. Main fuse
- 16. ECU
- 34. High beam indicator
- 39. Front right turn signal/position light
- 40. Front left turn signal/position light
- 42. Headlight relay
- 43. Dimmer switch
- 44. Headlight
- 50. Tail/brake light
- 51. License light
- 54. Headlight fuse
- 55. Signaling system fuse

### **TROUBLESHOOTING**

Any of the following fail to light: headlight, high beam indicator light, taillight, license light or meter light.

Before troubleshooting, remove the following part (s):

- 1. Seat
- 2. Side cover (left)
- 3. Air scoop (left/right)
- 4. Fuel tank

 Check the each bulbs and bulb sockets condition.
 Refer to "CHECKING THE BULBS AND BULB SOCKETS" on page 8-66.

 $NG \rightarrow$ 

Replace the bulb (s) and bulb socket (s).

OK↓

2. Check the fuses.
(Main, headlight and signal)
Refer to "CHECKING THE FUSES" on page 8-67.

 $NG \rightarrow$ 

Replace the fuse (s).

OK↓

Check the battery. Refer to "CHECKING AND CHARG-ING THE BATTERY" on page 8-68.

 $NG \rightarrow$ 

•Clean the battery terminals.

•Recharge or replace the battery.

OK↓

4. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-63.

 $NG \rightarrow$ 

Replace the main switch.

OK↓

5. Check the dimmer switch. Refer to "CHECKING THE SWITCHES" on page 8-63.

 $\mathsf{NG} { o}$ 

Replace the left handlebar switch.

OK↓

6. Check the headlight relay. Refer to "CHECKING THE RELAYS" on page 8-71.

 $NG \rightarrow$ 

Replace the headlight relay.

OK↓

7. Check the entire lighting system's wiring.
Refer to "CIRCUIT DIAGRAM" on page 8-15.

 $\mathsf{NG} { o}$ 

Properly connect or repair the lighting system's wiring.

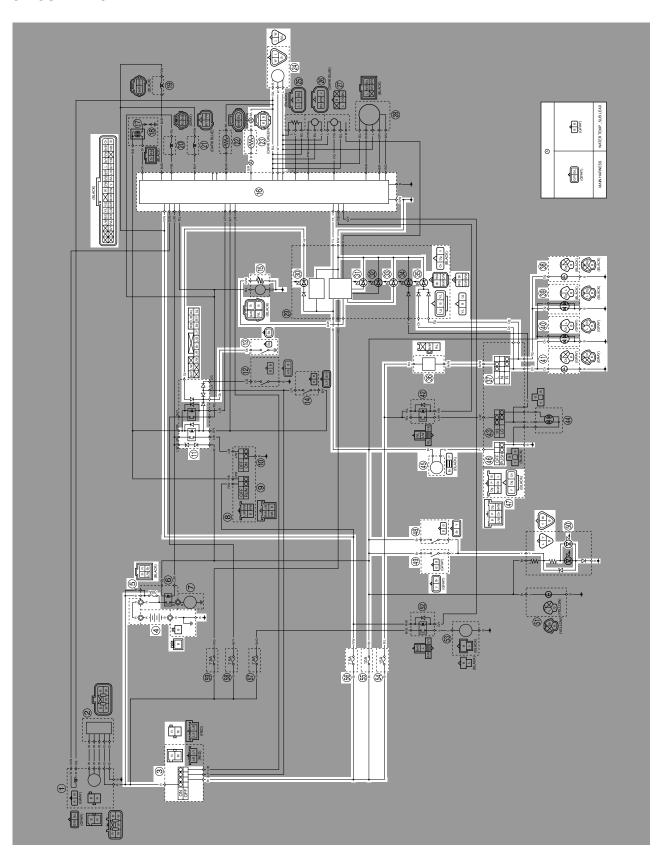
OK↓

Replace the ECU.

#### **SIGNALING SYSTEM**

EAS27280

#### **CIRCUIT DIAGRAM**



### SIGNALING SYSTEM

- 3. Main switch
- 4. Battery
- 5. Main fuse
- 11. Relay unit
- 13. Neutral switch
- 15. Fuel pump
- 16. ECU
- 23. Coolant temperature sensor
- 24. Speed sensor
- 30. Neutral indicator light
- 31. Coolant temperature warning light
- 33. Fuel level warning light
- 35. Turn signal indicator light
- 36. Turn signal relay
- 37. Turn signal switch
- 38. Rear right turn signal light
- 39. Front right turn signal/position light
- 40. Front left turn signal/position light
- 41. Rear left turn signal light
- 45. Horn
- 46. Horn switch
- 47. Left handlebar switch
- 48. Rear brake switch
- 49. Front brake switch
- 50. Tail/brake light
- 54. Headlight fuse
- 55. Signaling system fuse
- 56. Ignition fuse

FAS27290

#### **TROUBLESHOOTING**

- Any of the following fail to light: turn signal light, brake light, turn signal indicator light and fuel level warning light.
- The horn fails to sound.
- The speedometer does not operate normally.
- The fuel indicator light does not come on.
- The coolant temperature warning light does not operate normally.

#### NOTE:

Before troubleshooting, remove the following part (s):

- 1. Seat
- 2. Side cover (left)
- 3. Air scoop (left/right)
- 4. Fuel tank

 Check the fuses. (Main, ignition, signaling and headlight) Refer to "CHECKING THE FUSES" on page 8-67.

 $NG \rightarrow$ 

Replace the fuse (s).

OK↓

2. Check the battery.
Refer to "CHECKING AND CHARG-ING THE BATTERY" on page 8-68.

 $NG \rightarrow$ 

•Clean the battery terminals.

•Recharge or replace the battery.

OK↓

3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-63.

 $NG \rightarrow$ 

Replace the main switch.

OK↓

 Check the entire signaling system's wiring.
 Refer to "CIRCUIT DIAGRAM" on page 8-19.

 $NG \rightarrow$ 

Properly connect or repair the signaling system's wiring.

OK↓

This circuit is OK.

#### Check the signaling system

The horn fails to sound.

 Check the horn switch. Refer to "CHECKING THE SWITCHES" on page 8-63.

 $\mathsf{NG} { o}$ 

Replace the left handlebar switch.

OK↓

Check the horn. Refer to "CHECKING THE HORN" on page 8-77.

 $NG \rightarrow$ 

Replace the horn.

OK↓

 Check the entire signaling system's wiring.
 Refer to "CIRCUIT DIAGRAM" on page 8-19.

 $NG \rightarrow$ 

Properly connect or repair the signaling system's wiring.

OK↓

|  | 1            |   |
|--|--------------|---|
| This circuit is OK.  |              |   |
| The brake light fails to come on.  |              |   |
| Check the front brake light switch.     Refer to "CHECKING THE     SWITCHES" on page 8-63. | NG→          | Replace the front brake light switch.                     |
| OK↓  | •            |   |
| Check the rear brake light switch.     Refer to "CHECKING THE     SWITCHES" on page 8-63.  | NG→          | Replace the rear brake light switch.                      |
| OK↓  | •            |   |
| Check the entire signaling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-19.       | NG→          | Properly connect or repair the signaling system's wiring. |
| OK↓  |              |   |
| Replace the tail/brake light.  |              |   |
| The turn signal light, turn signal indicator   | light or bot | h fail to blink.  |
| Check the turn signal light bulb and   |              |   |
| socket. Refer to "CHECKING THE BULBS AND BULB SOCKETS" on page 8-66.                       | NG→          | Replace the turn signal light bulb, socket or both.       |
| OK↓  | 1            |   |
| Check the turn signal switch.     Refer to "CHECKING THE     SWITCHES" on page 8-63.       | NG→          | Replace the left handlebar switch.                        |
| OK↓  | ı            |   |
| 3. Check the turn signal relay.<br>Refer to "CHECKING THE RELAYS"<br>on page 8-71.         | NG→          | The turn signal relay is faulty and must be replaced.     |
| OK↓  | ı            |   |
| Check the entire signaling system's wiring.     Refer to "CIRCUIT DIAGRAM" on page 8-19.   | NG→          | Properly connect or repair the signaling system's wiring. |
| ОК↓  | •            |   |
| Replace the meter assembly.  |              |   |
| The neutral indicator light fails to come.   | •            |   |
| Check the neutral switch.     Refer to "CHECKING THE     SWITCHES" on page 8-63.           | NG→          | Replace the neutral switch.                               |
| ОК↓  | •            |   |
| Check the diode.     Refer to "CHECKING THE DIODE" on page 8-73.                           | NG→          | Replace the relay unit (Starting circuit cut-off relay).  |
| ОК↓  | •            |   |
|  |              |   |

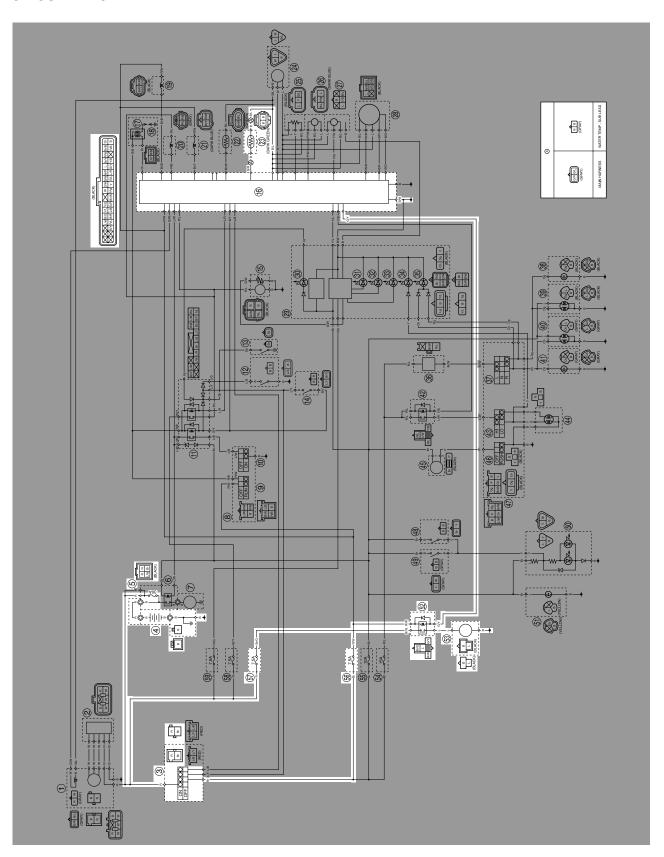
### SIGNALING SYSTEM

3. Check the entire signaling system's Properly connect or repair the signaling wiring.  $NG \rightarrow$ Refer to "CIRCUIT DIAGRAM" on page system's wiring. 8-19. OK↓ Replace the meter assembly. The speedometer fails to operate. Check the speed sensor. Refer to "CHECKING THE SPEED  $NG \rightarrow$ Replace the speed sensor. SENSOR" on page 8-77. OK↓ Check the entire signaling system's Properly connect or repair the signaling wiring.  $NG \rightarrow$ Refer to "CIRCUIT DIAGRAM" on page system's wiring. 8-19. OK↓ Replace the meter assembly. The fuel level warning light fails to come. 1. Check the fuel sender.  $NG \rightarrow$ Refer to "CHECKING THE FUEL Replace the fuel pump assembly. SENDER (FUEL PUMP)" on page 8-78. OK↓ 2. Check the entire signaling system's Properly connect or repair the signaling  $NG \rightarrow$ Refer to "CIRCUIT DIAGRAM" on page system's wiring. 8-19. OK↓ Replace the meter assembly. The coolant temperature warning light fails to operate. 1. Check the coolant temperature sensor.  $NG \rightarrow$ Replace the coolant temperature sensor. Refer to "CHECKING THE COOLANT TEMPERATURE SENSOR" on page 8-78. OK↓ 2. Check the entire signaling system's Properly connect or repair the signaling  $NG \rightarrow$ Refer to "CIRCUIT DIAGRAM" on page system's wiring. 8-19. OK↓ Replace the meter, ECU or both.

#### **COOLING SYSTEM**

EAS27310

#### **CIRCUIT DIAGRAM**



- 3. Main switch
- 4. Battery
- 5. Main fuse
- 16. ECU
- 23. Coolant temperature sensor
- 52. Radiator fan motor relay
- 53. Radiator fan motor
- 56. Ignition fuse
- 57. Radiator fan fuse

#### **TROUBLESHOOTING**

• The radiator fan fails to operate.

#### NOTE

Before troubleshooting, remove the following part (s):

- 1. Seat
- 2. Side cover (left)
- 3. Air scoop (left/right)
- 4. Fuel tank
- 5. Radiator cover
- 6. Drain the coolant.
- Check the fuses. (Main, ignition and radiator fan fuse) Refer to "CHECKING THE FUSES" on page 8-67.

 $NG \rightarrow$ 

Replace the fuse (s).

OK↓

2. Check the battery.
Refer to "CHECKING AND CHARG-ING THE BATTERY" on page 8-68.

 $NG \rightarrow$ 

- Clean the battery terminals.
- Recharge or replace the battery.

OK↓

3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-63.

 $NG \rightarrow$ 

Replace the main switch.

OK↓

 Check the radiator fan motor relay. Refer to "CHECKING THE RELAYS" on page 8-71.

 $NG \rightarrow$ 

Replace the radiator fan motor relay.

OK↓

5. Check the radiator fan motor. Refer to "CHECKING THE RADIATOR FAN MOTOR" on page 8-79.

 $NG \rightarrow$ 

The radiator fan motor is faulty and must be replaced.

OK↓

 Check the coolant temperature. Refer to "CHECKING THE COOLANT TEMPERATURE SENSOR" on page 8-78.

 $NG \rightarrow$ 

Replace the coolant temperature sensor.

OK↓

 Check the entire cooling system's wiring.
 Refer to "CIRCUIT DIAGRAM" on page 8-25.

 $NG \rightarrow$ 

Properly connect or repair the cooling system's wiring.

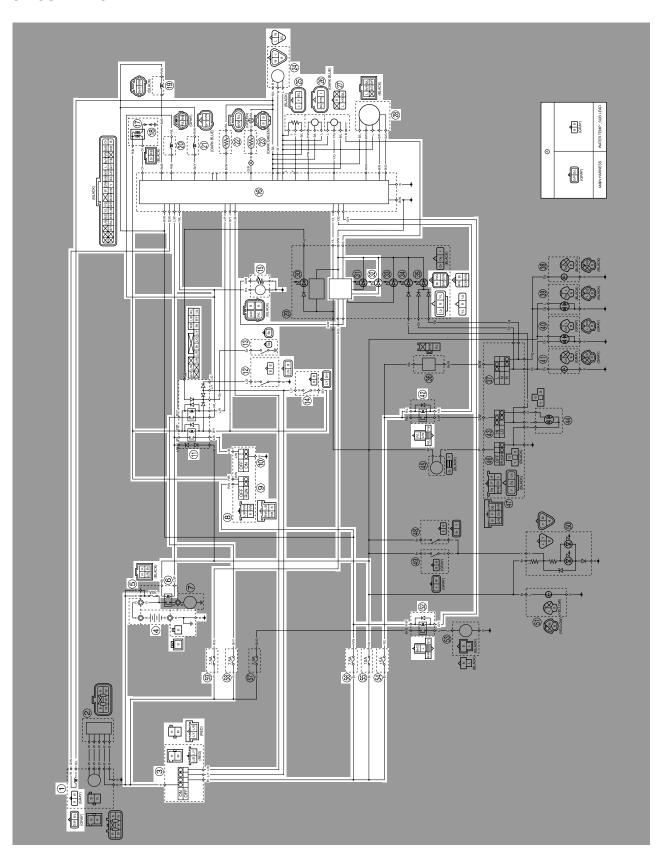
OK↓

Replace the ECU.

#### **FUEL INJECTION SYSTEM**

EAS27340

#### **CIRCUIT DIAGRAM**



- 1. AC magneto
- 3. Main switch
- 4. Battery
- 5. Main fuse
- 6. Starter relay
- 8. Right handlebar switch
- 9. Engine stop switch
- 10. Start switch
- 11. Relay unit
- 12. Sidestand switch
- 13. Neutral switch
- 14. Clutch switch
- 15. Fuel pump
- 16. ECU
- 17. Ignition coil
- 18. Spark plug
- 19. ITS solenoid
- 20. Fuel injector
- 21. Al solenoid
- 22. Intake air temperature sensor
- 23. Coolant temperature sensor
- 24. Speed sensor
- 25. Throttle position sensor
- 26. Intake air pressure sensor
- 27. Lean angle sensor
- 28. EXUP servo motor
- 32. Engine trouble warning light
- 42. Headlight relay
- 52. Radiator fan motor relay
- 54. Headlight fuse
- 55. Signaling system fuse
- 56. Ignition fuse
- 58. EFI fuse
- 59. Backup fuse

#### **ECU SELF-DIAGNOSTIC FUNCTION**

The ECU is equipped with a self-diagnostic function in order to ensure that the fuel injection system is operating normally. If this function detects a malfunction in the system, it immediately operates the engine under substitute characteristics and illuminates the engine trouble warning light to alert the rider that a malfunction has occurred in the system. Once a malfunction has been detected, a fault code is stored in the memory of the ECU.

- To inform the rider that the fuel injection system is not functioning, the engine trouble warning light flashes when the start switch is being pushed to start the engine.
- If a malfunction is detected in the system by the self-diagnostic function, the ECU provides an appropriate substitute characteristic operation, and alerts the rider of the detected malfunction by illuminating the engine trouble warning light.
- After the engine has been stopped, the lowest fault code number appears on the clock LCD. Once a
  fault code has been displayed, it remains stored in the memory of the ECU until it is deleted.

#### Engine trouble warning light indication and FI system operation

| Warning light indication | ECU operation                                | FI operation   | Vehicle operation                                     |
|--------------------------|--|--|---|
| Flashing*                | Warning provided when unable to start engine | Operation stopped  | Cannot be operated                                    |
| Remains on               | Malfunction detected                         | Operated with substitute characteristics in accordance with the description of the malfunction | Can or cannot be operated depending on the fault code |

<sup>\*</sup> The warning light flashes when any one of the conditions listed below is present and the start switch is pushed:

12: Crankshaft position sensor 41: Lean angle sensor (open or short-circuit)

19: Sidestand switch (open circuit in the wire to the ECU)

50: ECU internal malfunction (faulty ECU memory)

30: Lean angle sensor (Latch up detected)

Ignition coil

33: (Malfunction detected in the primary wire of the ignition coil)

#### Checking for a defective engine trouble warning light bulb

The engine trouble warning light comes on for 1.4 seconds after the main switch has been turned to "ON" and when the start switch is being pushed. If the warning light does not come on under these conditions, the warning light bulb may be defective.



- a. Main switch OFF
- b. Main switch ON
- c. Light OFF
- d. Light ON for 1.4 seconds

#### FAIL-SAFE ACTIONS (SUBSTITUTE CHARACTERISTICS OPERATION CONTROL)

If the ECU detects an abnormal signal from a sensor while the vehicle is being driven, the ECU illuminates the engine trouble warning light and provides the engine with alternate operating instructions that are appropriate for the type of malfunction.

When an abnormal signal is received from a sensor, the ECU processes the specified values that are programmed for each sensor in order to provide the engine with alternate operating instructions that enable the engine to continue to operate or stop operating, depending on the conditions.

The ECU takes fail-safe actions in two ways: one in which the sensor output is set to a prescribed value, and the other in which the ECU directly operates an actuator. Details on the fail-safe actions are given in the table below.

#### **Self-Diagnostic Function**

| Fault code<br>No. | Item   | Symptom   | Able /<br>unable to<br>start | Able /<br>unable to<br>drive |
|-------------------|--|---|------------------------------|------------------------------|
| 12                | Crankshaft position sensor                                 | No normal signals are received from the crankshaft position sensor.               | Unable                       | Unable                       |
| 13                | Intake air pressure sen-<br>sor<br>(open or short circuit) | Intake air pressure sensor-open or short circuit detected.                        | Able                         | Able                         |
| 14                | Intake air pressure sen-<br>sor<br>(pipe system)           | Intake air pressure sensor-pipe system malfunction (clogged or detached hose).    | Able                         | Able                         |
| 15                | Throttle position sensor (open or short circuit)           | Throttle position sensor-open or short circuit detected.                          | Able                         | Able                         |
| 16                | Throttle position sensor (stuck)                           | The throttle position sensor is stuck.  | Able                         | Able                         |
| 17                | EXUP servo motor circuit (open or short-circuit)           | EXUP servo motor circuit open or short circuit.                                   | Able                         | Able                         |
| 18                | EXUP servomotor (stuck)                                    | EXUP servo motor is stuck.  | Able                         | Able                         |
| 19                | Sidestand switch<br>(open circuit wire harness to ECU)     | Open circuit is detected in the input line from the sidestand switch to the ECU.  | Unable                       | Unable                       |
| 21                | Coolant temperature sensor                                 | Coolant temperature sensor-open or short circuit detected.                        | Able                         | Able                         |
| 22                | Intake air temperature sensor                              | Intake air temperature sensor-open or short circuit detected.                     | Able                         | Able                         |
| 30                | Lean angle sensor  | Latch up detected.<br>No normal signal is received from the<br>lean angle sensor. | Unable                       | Unable                       |
| 33                | Ignition coil<br>(faulty ignition)                         | Malfunction detected in the primary wire of the ignition coil.                    | Unable                       | Unable                       |
| 41                | Lean angle sensor (open or short circuit)                  | Lean angle sensor-open or short circuit detected.                                 | Unable                       | Unable                       |
| 42                | Speed sensor   | No normal signals are received from the speed sensor.                             | Able                         | Able                         |
| <b>⊣</b> ∠        | Neutral switch   | Open or short circuit is detected in the neutral switch.                          | Able                         | Able                         |
| 43                | Fuel system voltage (monitor voltage)                      | Supply power to the fuel injector and fuel pump is not normal.                    | Able                         | Able                         |

| Fault code<br>No. | Item   | Symptom  | Able /<br>unable to<br>start | Able /<br>unable to<br>drive |
|-------------------|--|--|------------------------------|------------------------------|
| 44                | Error in writing the amount of CO adjustment on EEPROM | Error is detected while reading or writing on EEPROM (code re-registering key code and throttle valve fully closed notification value).  | Able                         | Able                         |
| 46                | Vehicle system power<br>supply<br>(Monitor voltage)    | Power supply to the ECU system relay is not normal.  | Able                         | Able                         |
| 50                | ECU internal malfunction (memory check error)          | Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.)  | Unable                       | Unable                       |
| 70                | Left idle control                                      | After 20 minutes left idling, the ECU automatically stops the engine.  | Able                         | Able                         |
| _                 | Start unable warning                                   | Engine trouble warning light flashes when the start switch is turned ON. Relay is not turned ON even if the crank signal is input while the start switch is turned ON. When the start switch is turned ON while an error is detected with the fault code of No.12, 19, 30, 41 or 50. | Unable                       | Unable                       |

#### Communication error with the multifunction meter

| Fault code<br>No. | ltem   | Symptom   | Able /<br>unable to<br>start | Able /<br>unable to<br>drive |
|-------------------|--|---|------------------------------|------------------------------|
| Er-1              | ECU internal malfunction (output signal error) | No signals are received from the ECU.                               | Able*                        | Able*                        |
| Er-2              | ECU internal malfunction (output signal error) | No signals are received from the ECU within the specified duration. | Able*                        | Able*                        |
| Er-3              | ECU internal malfunction (output signal error) | Data from the ECU cannot be received correctly.                     | Able*                        | Able*                        |
| Er-4              | ECU internal malfunction (input signal error)  | Non-registered data has been received from the meter.               | Able*                        | Able*                        |

<sup>\*</sup> If multiple malfunctions have been detected for the ECU, you may not be able to start or drive the vehicle.

#### TROUBLESHOOTING METHOD

The engine operation is not normal and the engine trouble warning light comes on.

- 1. Check:
- Fault code number

\*\*\*\*\*\*\*\*\*\*\*\*\*

- a. Check the fault code number displayed on the meter.
- b. Identify the system with the malfunction. Refer to "Self-Diagnostic Function table".
- c. Identify the probable cause of malfunction. Refer to "Diagnostic monitoring code table".

#### 

2. Checking and repair the probable case of malfunction.

| Fault code No. YES  | Fault code No. NO   |
|---|---|
| Check and repair. Refer to "TROUBLESHOOT-ING DETAILS" on page 8-41. Monitor the operation of the sensors and actuators in the diagnostic mode. Refer to "Sensor operation table". | Check and repair. Refer<br>to "TROUBLESHOOT-<br>ING DETAILS" on page<br>8-41. |

- 3. Perform ECU reinstatement action.

  Refer to "Reinstatement method" of table in "TROUBLESHOOTING DETAILS".
- 4. Turn the main switch to "OFF" and back to "ON", then check the fault code number is not displayed.

#### NOTE:

If other fault code displayed, repeat steps (1) to (4) until all fault code number is not displayed.

 The Malfunction history is stored even if the main switch is turned OFF. The malfunction history must be erased in the diagnostic mode. Refer to "Sensor operation table (Diagnostic code No.62)".

# The engine operation is not normal but the engine trouble warning light does not come on.

- 1. Check the operation of following sensors and actuators in the Diagnostic mode. Refer to "Sensor operation table".
- 01: Throttle position sensor (throttle angle)
- 30: Ignition coil #1
- 36: Injector #1
- 48: Al solenoid

If malfunction the sensors or actuators, repair or replace it.

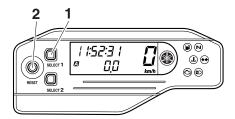
If not malfunction the sensors and actuators, check and repair the engine inner parts.

EAS2744

#### **DIAGNOSTIC MODE**

Setting the diagnostic mode

- 1. Turn the main switch to "OFF" and set the engine stop switch to "ON".
- 2. Disconnect the wire harness coupler from the fuel pump.
- 3. Simultaneously press and hold the "SELECT1" "1" and "RESET" "2" buttons, turn the main switch to "ON", and continue to press the buttons for 8 seconds or more.



#### NOTE

- All displays on the meter disappear except the clock and tripmeter displays.
- "dIAG" appears on the clock LCD.
- 4. Press the "SELECT1" button to select the CO adjustment mode "CO" or the diagnostic mode "dIAG".
- 5. After selecting "dIAG", simultaneously press the "SELECT" and "RESET" buttons for 2 seconds or more to execute the selection.
- 6. Set the engine stop switch to "OFF".
- Select the diagnostic code number that applies to the item that was verified with the fault code number by pressing the "SELECT1" and "RESET" buttons.

#### NOTE:

The diagnostic code number appears on the clock LCD (01–70).

- To decrease the selected diagnostic code number, press the "RESET" button. Press the "RESET" button for 1 second or longer to automatically decrease the diagnostic code numbers.
- To increase the selected diagnostic code number, press the "SELECT" button. Press the "SELECT" button for 1 second or longer to automatically increase the diagnostic code num-

#### bers.

- 8. Verify the operation of the sensor or actuator.
  - Sensor operation
     The data representing the operating conditions of the sensor appears on the trip LCD.
  - Actuator operation
     Set the engine stop switch to "ON" to operate the actuator.

#### NOTE:

If the engine stop switch is set to "ON", set it to "OFF", and then set it to "ON" again.

9. Turn the main switch to "OFF" to cancel the diagnostic mode.

### Diagnostic code table

| Fault<br>code<br>No. | Symptom   | Probable cause of malfunction  | Diagnostic code No. |
|----------------------|---|--|---------------------|
| 12                   | No normal signals are received from the crankshaft position sensor.               | <ul> <li>Open or short circuit in wire harness.</li> <li>Defective crankshaft position sensor.</li> <li>Malfunction in pickup rotor.</li> <li>Malfunction in ECU.</li> <li>Improperly installed sensor.</li> </ul> | _                   |
| 13                   | Intake air pressure sensor-open or short circuit detected.                        | <ul><li>Open or short circuit in wire harness.</li><li>Defective intake air pressure sensor.</li><li>Malfunction in ECU.</li></ul>   | 03                  |
| 14                   | Intake air pressure sensor-pipe system malfunction (clogged hose).                | <ul><li>Intake air pressure sensor hose is clogged.</li><li>Malfunction in ECU.</li></ul>  | 03                  |
| 15                   | Throttle position sensor-open or short circuit detected.                          | <ul><li>Open or short circuit in wire harness.</li><li>Defective throttle position sensor.</li><li>Malfunction in ECU.</li></ul>   | 01                  |
| 16                   | Stuck throttle position sensor detected.  | <ul><li>Stuck throttle position sensor.</li><li>Malfunction in ECU.</li></ul>  | 01                  |
| 17                   | EXUP servo motor circuit open or short circuit.                                   | <ul><li>Open circuit in wire harness.</li><li>Defective EXUP servo motor.</li><li>ECU is defective.</li></ul>  | 53                  |
| 18                   | EXUP servo motor is stuck.  | <ul><li>Open circuit in wire harness.</li><li>EXUP servo motor lockup (valve or motor)</li></ul>   | 53                  |
| 19                   | Open circuit is detected in the input line from the sidestand switch to the ECU.  | <ul><li>Open or short circuit in wire harness.</li><li>Malfunction in ECU.</li></ul>   | 20                  |
| 21                   | Coolant temperature sensor-open or short circuit detected.                        | <ul> <li>Open or short circuit in wire harness.</li> <li>Defective coolant temperature sensor.</li> <li>Malfunction in ECU.</li> </ul>   | 06                  |
| 22                   | Intake air temperature sensor-open or short circuit detected.                     | <ul> <li>Open or short circuit in wire harness.</li> <li>Defective intake temperature sensor.</li> <li>Malfunction in ECU.</li> <li>Improperly installed intake air temperature sensor.</li> </ul>                 | 05                  |
| 30                   | Latch up detected.<br>No normal signal is received<br>from the lean angle sensor. | <ul> <li>The vehicle has overturned.</li> <li>Defective lean angle sensor.</li> <li>Malfunction in ECU.</li> <li>Improperly installed lean angle sensor.</li> </ul>  | 08                  |
| 33                   | Malfunction detected in the primary wire of the ignition coil.                    | <ul> <li>Open or short circuit in wire harness.</li> <li>Malfunction in ignition coil.</li> <li>Malfunction in ECU.</li> <li>Malfunction in a component of ignition cut-off circuit system.</li> </ul>             | 30                  |
| 41                   | Lean angle sensor-open or short circuit detected.                                 | <ul><li>Open or short circuit in wire harness.</li><li>Defective lean angle sensor.</li><li>Malfunction in ECU.</li></ul>  | 08                  |

| Fault<br>code<br>No. | Symptom   | Probable cause of malfunction  | Diagnostic code No. |
|----------------------|---|--|---------------------|
| 42                   | No normal signals are received from the speed sensor.   | <ul> <li>Open or short circuit in wiring harness.</li> <li>Defective speed sensor.</li> <li>Malfunction in vehicle speed sensor detected unit.</li> <li>Malfunction in ECU.</li> </ul> | 07                  |
|                      | Open or short circuit in neutral switch.  | <ul><li>Open circuit in wire harness.</li><li>Defective neutral switch.</li><li>ECU is defective.</li></ul>  | 21                  |
| 43                   | Supply power to the fuel injector and fuel pump is not normal.  | <ul><li>Open circuit in wire harness.</li><li>Malfunction in ECU.</li><li>Defective relay unit (fuel pump).</li></ul>  | 09                  |
| 44                   | Error is detected while reading or writing on EEPROM.   | Malfunction in ECU. (CO concentration<br>adjustment valve cannot be correctly writ-<br>ten to or read from internal memory)  | 60                  |
| 46                   | Power supply to the FI system relay is not normal.  | Malfunction in charging system.  | _                   |
| 50                   | Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.) | Malfunction in ECU. (The program and data are not properly written on or read from the internal memory.)   | _                   |
| 70                   | Left idle control   | After 20 minutes left idling, the ECU automatically stops the engine.  | _                   |
| Er-1                 | No signals are received from the ECU.   | <ul> <li>Open or short circuit in communication line.</li> <li>Malfunction in meter unit.</li> <li>Malfunction in ECU.</li> </ul>  | _                   |
| Er-2                 | No signals are received from the ECU within the specified duration.   | <ul> <li>Open or short circuit in communication line.</li> <li>Malfunction in meter unit.</li> <li>Malfunction in ECU.</li> </ul>  | _                   |
| Er-3                 | Data from the ECU cannot be received correctly.   | <ul> <li>Open or short circuit in communication line.</li> <li>Malfunction in meter unit.</li> <li>Malfunction in ECU.</li> </ul>  | _                   |
| Er-4                 | Non-registered data has been received from the meter.   | <ul> <li>Open or short circuit in communication line.</li> <li>Malfunction in meter unit.</li> <li>Malfunction in ECU.</li> </ul>  | _                   |

### Sensor operation table

| Diagnos<br>tic<br>monitori<br>ng code<br>No. | ltem                  | Meter display | Checking method                   |
|--|-----------------------|---------------|-----------------------------------|
| 01   | Throttle angle        |               |                                   |
|  | Fully closed position | 15–19         | Check with throttle fully closed. |
|  | Fully opened position | 95–100        | Check with throttle fully open.   |

| Diagnos<br>tic             |  |  |   |
|----------------------------|--|--|---|
| monitori<br>ng code<br>No. | Item   | Meter display  | Checking method   |
| 03                         | Pressure difference<br>(atmospheric pressure-intake<br>air pressure) | Displays the intake air pressure.                              | Set "()" the engine stop<br>switch, and then push the<br>start switch. (If the display<br>value changes, the perfor-<br>mance is OK.) |
| 05                         | Intake air temperature   | Displays the intake air temperature.                           | Compare the actually measured intake air temperature with the meter display value. (*1)   |
| 06                         | Coolant temperature  | Displays the coolant temperature.                              | Compare the actually measured coolant temperature with the meter display value.   |
| 07                         | Vehicle speed pulse  | 0–999  | Check that the number changes (integrating) when the rear wheels are rotated.   |
| 08                         | Lean angle sensor  |  | Remove the lean angle sensor and incline it more than 65  |
|                            | Upright  | 0.4–1.4 V  | degrees.  |
|                            | Overturned   | 3.7–4.4 V  |   |
| 09                         | Fuel system voltage (battery voltage)                                | Approximately 12.0 V   | Compare with the actually measured battery voltage. (If the battery voltage is lower, perform recharging.)                            |
| 20                         | Sidestand switch   |  | Set ON/OFF the sidestand  |
|                            | Stand retracted  | ON   | switch. (with the transmission in gear)   |
|                            | Stand extended   | OFF  |   |
| 21                         | Neutral switch   |  | Shift the transmission.   |
|                            | Neutral  | ON   |   |
|                            | • In gear  | OFF  |   |
| 60                         | EEPROM fault code display  |  | _   |
|                            | No fault   | 00   |   |
|                            | History exists   | 04 (Throttle valve fully open notification value is detected.) |   |

| Diagnos<br>tic<br>monitori<br>ng code<br>No. | ltem                             | Meter display  | Checking method                                       |
|--|----------------------------------|--|---|
| 61   | Malfunction history code display |  | _   |
|  | No history                       | 00   |   |
|  | History exists                   | 12–70 (Fault detection code)  ● (If code numbers more than one are detected, the display alternates every two seconds to show all the detected code numbers. When all code numbers are shown, the display repeats the same process.) |   |
| 62   | Malfunction history code erasure |  |   |
|  | No history                       | 00   | _   |
|  | History exists                   | 00–20 (Memory numbers of the fault detection)  | To erase the history, turn ON the engine stop switch. |
| 63   | Repeated display of trouble code |  |   |
|  | No malfunction code              | 0  |   |
|  | Malfunction code exists          | Trouble code 24  |   |
| 70   | Control number                   | 00–255   | _   |

<sup>\*1</sup> If it is not possible to check the intake temperature, use the ambient temperature as reference (use the compared values for reference).

### **Actuator operation table**

| Diagnos<br>tic<br>monitori<br>ng code<br>No. | Item                          | Actuation  | Checking method   |
|--|-------------------------------|--|---|
| 30   | Ignition coil                 | Actuates the ignition coil for five times every second. Illuminates the engine trouble warning light.  | Check the spark five times.  Connect an ignition checker. |
| 36   | Injector                      | Actuates the injector for five times every second. Illuminates the engine trouble warning light.   | Check the operating sound of the injector five times.     |
| 48   | Air induction system solenoid | Actuates the air inducton system solenoid for five times every second. Illuminates the engine trouble warning light. (Light OFF: Air induction system solenoid "ON", Light OFF: Air induction system solenoid "OFF") | Check the operating sound of the solenoid five times.     |

| Diagnos<br>tic<br>monitori<br>ng code<br>No. | Item                        | Actuation   | Checking method  |  |
|--|-----------------------------|---|--|--|
| 49   | Intake solenoid             | Actuates the intake solenoid for five times every second. Illuminates the engine trouble warning light.   | Check the operating sound of the solenoid five times.        |  |
| 50   | Fuel injection system relay | Actuates the fuel injection system relay for five times every second. Illuminates the engine trouble warning light. (The engine trouble warning light is OFF when the relay is ON, and the engine trouble warning light is ON when the relay is OFF). | Check the operating sound of the relay five times.           |  |
| 51   | Radiator fan motor relay    | Actuates the radiator fan motor relay for five times every second. (ON two seconds, OFF three seconds) Illuminates the engine trouble warning light.  | Check the operating sound of the relay five times.           |  |
| 52   | Headlight relay             | Actuates the headlight relay for five times every five-second. (ON two seconds, OFF three seconds) Illuminates the engine trouble warning light five times.   | Check the operating sound of the headlight relay five times. |  |
| 53   | EXUP servo motor            | Turn the servo motor once in the open direction and then in the close direction. Illuminates the engine trouble warning light.  | Check the operating sound of the EXUP motor.                 |  |

#### TROUBLESHOOTING DETAILS

This section describes the measures per fault code number displayed on the meter. Carry out check and maintenance on items or components that could be a cause of malfunction in accordance with the order.

When the check and maintenance of malfunctioned part is completed, restore the meter display according to the "Reinstatement method".

Fault code No.:

Fault code number displayed on the meter when the engine failed to work normally. Refer to "DIAGNOSTIC MODE" on page 8-34.

Diagnostic monitoring code No.:

Code number to be used when the diagnostic monitoring mode is operated. Refer to "DIAGNOSTIC MODE" on page 8-34.

| Fault           | code No.                                 | 12       | Symptom                                       | No norma sensor. | al signals are received from the cran  | kshaft position      |
|-----------------|--|----------|---|------------------|--|----------------------|
| Diagn<br>code I | ostic monito                             | ring     | _   | _                |  |                      |
| Order           | Order Item/components and probable cause |          |   |                  | Check or maintenance job   | Reinstatement method |
| 1               | Installed co                             | ndition  | of crankshaf                                  | t position       | Check the installed area for looseness or pinching.  | Cranking the engine. |
| 2               |  | ft posit | of connector<br>tion sensor co<br>ss ECU coup |                  | <ul> <li>Check the coupler for any pins that may have pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect it securely.</li> </ul> |                      |
| 3               | Open or short circuit in wire harness.   |          |   |                  | <ul> <li>Repair or replace if there is an open or short circuit.</li> <li>Between the crankshaft position sensor coupler and ECU coupler. (Green/White–Green/White) (Black/Blue–Black/Blue)</li> </ul>   |                      |
| 4               | Defective cr                             | anksh    | aft position se                               | ensor.           | Replace if defective. Refer to "CHECKING THE CRANKSHAFT POSITION SENSOR" on page 8-75.   |                      |

| Fault o | code No.  | 13 | Symptom | Intake air | Intake air pressure sensor-open or short circuit detected.  |                             |  |
|---------|---|----|---------|------------|---|-----------------------------|--|
| Diagno  | Diagnostic monitoring code No. Intake a   |    |         |            | pressure sensor   |                             |  |
| Order   | r Item/components and probable cause  |    |         |            | Check or maintenance job  | Reinstatement method        |  |
| 1       | Connected state of connector  • Intake air pressure sensor coupler  • Main wire harness ECU coupler |    |         |            | <ul> <li>Check the coupler for any pins that may have pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect it securely.</li> </ul>                      | Turning the main switch ON. |  |
| 2       | Open or short circuit in wire harness.  |    |         |            | <ul> <li>Repair or replace if there is an open or short circuit.</li> <li>Between intake air pressure sensor coupler and ECU coupler (Black/Blue–Black/Blue)</li> <li>(Pink/White–Pink/White)</li> <li>(Blue–Blue)</li> </ul> |                             |  |
| 3       | Defective intake air pressure sensor  |    |         |            | <ul> <li>Execute the diagnostic monitoring mode. (Code No.03)</li> <li>Replace if defective.</li> <li>Refer to "CHECKING THE INTAKE AIR PRESSURE SENSOR" on page 8-80.</li> </ul>   |                             |  |

| Fault | code No.  | 14     | Symptom                         | Intake air<br>hose). | ntake air pressure sensor-hose system malfunction (clogged nose).  |   |  |  |
|-------|---|--------|---------------------------------|----------------------|--|---|--|--|
|       | Diagnostic monitoring code No. 03 Intake ai   |        |                                 |                      | pressure sensor  |   |  |  |
| Order | der Item/components and probable cause  |        |                                 |                      | Check or maintenance job   | Reinstatement method                          |  |  |
| 1     | Intake air pı   | essure | e sensor hose                   | e clogged.           | <ul><li>Check the intake air pressure sensor hose condition.</li><li>Repair or replace the sensor hose.</li></ul>  | Starting the engine and operating it at idle. |  |  |
| 2     |   |        | e sensor malf<br>rical potentia |                      | Check and repair the connection.   |   |  |  |
| 3     | Connected state of connector  Intake air pressure sensor coupler  Main wire harness ECU coupler |        |                                 |                      | <ul> <li>Check the coupler for any pins that may have pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect it securely.</li> </ul> |   |  |  |
| 4     | Defective intake air pressure sensor  |        |                                 | ensor                | <ul> <li>Execute the diagnostic monitoring mode. (Code No.03)</li> <li>Replace if defective.</li> <li>Refer to "CHECKING THE INTAKE AIR PRESSURE SENSOR" on page 8-80.</li> </ul>                        |   |  |  |

| Fault o | code No.                      | 15                   | Symptom                                     | Throttle p   | osition sensor-op  | en or short circuit                                | detected.                   |  |
|---------|-------------------------------|----------------------|---|--------------|--|--|-----------------------------|--|
| Diagno  | ostic monito<br>No.           | ring                 | 01  | Throttle p   | position sensor  |  |                             |  |
| Order   | Item/compo                    | onents               | s and probal                                | ole cause    | Check or mainter   | nance job  | Reinstatement method        |  |
| 1       | Installed corsor.             | ndition              | of throttle po                              | osition sen- | ness or pinching   | led area for loose-<br>g.<br>stalled in the speci- | Turning the main switch ON. |  |
| 2       |                               | ositio               | of connector<br>on sensor co<br>ness ECU co | •            | <ul> <li>Check the coupler for any pins that may have pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect it securely.</li> </ul> |  |                             |  |
| 3       | Open or sho<br>or sub lead.   |                      | uit in wire ha                              | rness and/   | <ul> <li>Repair or replace open or short cires</li> <li>Between throttle coupler and ECI (Black/Blue–Black (Yellow–Yellow)</li> <li>(Blue–Blue)</li> </ul>   |  |                             |  |
| 4       | Throttle pos<br>circuit outpu | sition s<br>ut volta | ensor lead w<br>ge check.                   | ire open     | Check for open circuit and replace the throttle position sensor.  (Black/Blue_Yellow)  |  |                             |  |
|         |                               |                      |   |              | Open circuit item  | Output voltage                                     |                             |  |
|         |                               |                      |   |              | Ground wire open circuit   | 5 V  |                             |  |
|         |                               |                      |   |              | Output wire open circuit   | 0 V  |                             |  |
|         |                               |                      |   |              | Power supply wire open circuit   | 0 V  |                             |  |
| 5       | Defective th                  | rottle p             | oosition sens                               | or.          | mode. (Code No<br>• Replace if defect<br>Refer to "Ch  | tive.<br>HECKING THE<br>OSITION SEN-               |                             |  |

| Fault o                        | code No. 16 Symptom Stuck thr                    |       |                          | Stuck thro | nrottle position sensor detected.   |  |  |
|--------------------------------|--|-------|--------------------------|------------|---|--|--|
| Diagnostic monitoring code No. |  | 01    | Throttle position sensor |            |   |  |  |
| Order                          | Item/comp  | onent | s and probal             | ole cause  | Check or maintenance job  | Reinstatement method   |  |
| 1                              | Installed condition of throttle position sensor. |       |                          |            | <ul> <li>Check the installed area for looseness or pinching.</li> <li>Check that is installed in the specified position.</li> </ul>   | Reinstated by<br>starting the<br>engine, operating<br>it at idle.<br>And then racing |  |
| 2                              | Defective throttle position sensor.              |       |                          |            | <ul> <li>Execute the diagnostic monitoring mode. (Code No.01)</li> <li>Replace if defective.</li> <li>Refer to "CHECKING THE THROTTLE POSITION SENSOR" on page 8-79.</li> </ul> | it.  |  |

| Fault o | code No.  | 17                            | Symptom    | EXUP ser  | servo motor circuit open or short circuit  |                               |  |
|---------|---|-------------------------------|------------|-----------|--|-------------------------------|--|
| Diagno  | ostic monito  | onitoring 53 EXUP servo motor |            |           |  |                               |  |
| Order   | Order Item/components and probable cause  |                               |            | ole cause | Check or maintenance job   | Reinstatement method          |  |
| 1       | Connected state of connector.  • EXUP servo motor coupler  • Wire harness ECU coupler |                               |            |           | <ul> <li>Check the coupler for any pins that may have pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect it securely.</li> </ul> | Turn the main switch to "ON". |  |
| 2       | Open or short circuit in wire harness.  |                               |            | rness.    | <ul> <li>Repair or replace if there is an open or short circuit.</li> <li>Between EXUP servo motor coupler and ECU coupler (Black/Blue–Black/Blue) (White/Red–White/Red) (Blue–Blue)</li> </ul>          |                               |  |
| 3       | Defective E.  | XUP s                         | ervo motor |           | <ul> <li>Execute the diagnostic monitoring mode. (Code No.53)</li> <li>Replace if defective.</li> </ul>  |                               |  |

| Fault           | code No.  | 18    | Symptom        | EXUP sei  | rvo motor is stuck.  |                               |
|-----------------|---|-------|----------------|-----------|--|-------------------------------|
| Diagn<br>code I | ostic monito  | oring | 53             | EXUP ser  | rvo motor  |                               |
| Order           | er Item/components and probable cause   |       |                | ole cause | Check or maintenance job   | Reinstatement method          |
| 1               | Connected state of connector.  • EXUP servo motor coupler  • Wire harness ECU coupler |       |                |           | <ul> <li>Check the coupler for any pins that may have pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect it securely.</li> </ul> | Turn the main switch to "ON". |
| 2               | Open or short circuit in wire harness.  |       |                |           | <ul> <li>Repair or replace if there is an open or short circuit.</li> <li>Between EXUP servo motor coupler and ECU coupler (Black/Red-Black/Red) (Black/Green-Black/Green)</li> </ul>                    |                               |
| 3               | Defective E   | XUP s | ervo motor     |           | <ul> <li>Execute the diagnostic monitoring<br/>mode. (Code No.53)</li> <li>Replace if defective.</li> </ul>  |                               |
| 4               | Defective E   | XUP v | alve. pullv an | d cable.  | Replace if defective.  | 1                             |

| Fault  | code No.  | 19     | Symptom    | Open circuit is detected in the input line from the sidestand switch to the ECU. |  |   |  |  |
|--------|---|--------|------------|--|--|---|--|--|
| Diagno | ostic monito  | ring   | 20         | Sidestand  | stand switch   |   |  |  |
| Order  | Item/components and probable cause                            |        |            | ole cause  | Check or maintenance job   | Reinstatement method  |  |  |
| 1      | Connected state of connector  • Main wire harness ECU coupler |        |            |  | <ul> <li>Execute the diagnostic monitoring mode. (Code No.20)</li> <li>Check the coupler for any pins that may have pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect it securely.</li> </ul> | If the transmission is in gear, retracting the sidestand. If the transmission is in neutral, reconnecting the wiring. |  |  |
| 2      | Open or short circuit in wire harness.                        |        |            | rness.   | <ul> <li>Repair or replace if there is an open or short circuit.</li> <li>Between relay unit and main switch coupler.</li> <li>(Blue/Yellow-Blue/Yellow)</li> <li>Between ECU and main switch coupler.</li> <li>(Blue/Black-Blue/Black)</li> </ul>                     |   |  |  |
| 3      | Defective si  | destar | nd switch. |  | Replace if defective.  Refer to "CHECKING THE SWITCHES" on page 8-63.  |   |  |  |

| Fault o | code No.  | 21              | Symptom  | Coolant te | nt temperature sensor-open or short circuit detected.  |                             |  |
|---------|---|-----------------|--|------------|--|-----------------------------|--|
|         | Diagnostic monitoring code No.                          |                 |  | Coolant te | emperature sensor  |                             |  |
| Order   | er Item/components and probable cause                   |                 |  |            | Check or maintenance job   | Reinstatement method        |  |
| 1       | Installed co<br>sensor.                                 | ndition         | of coolant te  | mperature  | Check the installed area for looseness or pinching.  | Turning the main switch ON. |  |
| 2       | <ul> <li>Coolant to</li> </ul>                          | empera<br>harne | of connector<br>ature sensor o<br>ess ECU coup<br>es coupler |            | <ul> <li>Check the coupler for any pins that may have pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect it securely.</li> </ul> |                             |  |
| 3       | Open or short circuit in wire harness and/ or sub lead. |                 |  |            | <ul> <li>Repair or replace if there is an open or short circuit.</li> <li>Between coolant temperature sensor coupler and ECU coupler.</li> <li>(Black–Black/Blue)</li> <li>(Black–Green/Red)</li> </ul>  |                             |  |
| 4       | Defective coolant temperature sensor.                   |                 |  |            | <ul> <li>Execute the diagnostic monitoring mode. (Code No.06)</li> <li>Replace if defective.</li> <li>Refer to "CHECKING THE COOLANT TEMPERATURE SENSOR" on page 8-78.</li> </ul>                        |                             |  |

| Fault o                                  | code No.   | 22 | Symptom       | Intake air | r temperature sensor-open or short circuit detected.  |                             |  |
|--|--|----|---------------|------------|---|-----------------------------|--|
|  | Diagnostic monitoring code No.   |    |               | Intake air | ir temperature sensor   |                             |  |
| Order Item/components and probable cause |  |    |               | ole cause  | Check or maintenance job  | Reinstatement method        |  |
| 1  | Installed conture sensor.  |    | of intake air | tempera-   | Check the installed area for looseness or pinching.   | Turning the main switch ON. |  |
| 2  | Connected state of connector  Intake air temperature sensor coupler  Main wire harness ECU coupler |    |               |            | <ul> <li>Check the coupler for any pins that may have pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect it securely.</li> </ul>                |                             |  |
| 3  | Open or short circuit in wire harness and/ or sub lead.  |    |               | rness and/ | <ul> <li>Repair or replace if there is an open or short circuit.</li> <li>Between intake air temperature sensor coupler and ECU coupler.</li> <li>(Black/Blue–Black/Blue)</li> <li>(Brown/White–Brown/White)</li> </ul> |                             |  |
| 4  | Defective intake air temperature sensor.   |    |               |            | <ul> <li>Execute the diagnostic monitoring mode. (Code No.05)</li> <li>Replace if defective.</li> <li>Refer to "CHECKING THE INTAKE AIR TEMPERATURE SENSOR" on page 8-80.</li> </ul>                                    |                             |  |

| Fault | code No. 30 S  |         | Symptom       |                   | Latch up detected.<br>No normal signal is received from the lean angle sensor.   |  |  |  |
|-------|--|---------|---------------|-------------------|--|--|--|--|
|       | Diagnostic monitoring code No.   |         | Lean ang      | Lean angle sensor |  |  |  |  |
| Order | er Item/components and probable cause  |         |               |                   | Check or maintenance job   | Reinstatement method   |  |  |
| 1     | The vehicle  | has o   | verturned.    |                   | Raise the vehicle upright.   | Turning the main switch ON (however, the engine cantorted upload |  |  |
| 2     | Installed co<br>sor  | ndition | of the lean a | ingle sen-        | Check the installed area for looseness or pinching.  |  |  |  |
| 3     | Connected state of connector  • Lean angle sensor coupler  • Main wire harness ECU coupler |         |               |                   | <ul> <li>Check the coupler for any pins that may have pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect it securely.</li> </ul> | restarted unless<br>the main switch<br>is first turned<br>OFF).  |  |  |
| 4     | Defective lean angle sensor.   |         |               |                   | <ul> <li>Execute the diagnostic monitoring mode. (Code No.08)</li> <li>Replace if defective.</li> </ul>  |  |  |  |

| Fault                          | Fault code No. 33  |         | Symptom | Malfuncti  | alfunction detected in the primary wire of the ignition coil.   |   |  |  |
|--------------------------------|--|---------|---------|------------|---|---|--|--|
| Diagnostic monitoring code No. |  |         | 30      | Ignition c | Ignition coil   |   |  |  |
| Order                          | er Item/components and probable cause  |         |         |            | Check or maintenance job  | Reinstatement method                          |  |  |
| 1                              | Connected state of connector  Ignition coil primary side coupler (Orange)  Main wire harness ECU coupler |         |         |            | <ul> <li>Check the coupler for any pins that may have pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect it securely.</li> </ul>    | Starting the engine and operating it at idle. |  |  |
| 2                              | Open or short circuit in wire harness or sub lead.   |         |         |            | <ul> <li>Repair or replace if there is an open or short circuit.</li> <li>Between ignition coil coupler and ECU coupler/main wire harness.</li> <li>(Orange–Orange)</li> </ul>                              |   |  |  |
| 3                              | Defective ig   | gnition | coil    |            | <ul> <li>Execute the diagnostic monitoring mode. (Code No.30)</li> <li>Test the primary and secondary coils for continuity.</li> <li>Replace if defective.</li> <li>Refer to "CHECKING THE IGNI-</li> </ul> |   |  |  |

TION COIL" on page 8-74.

| Fault o | Fault code No. 41 Symptom Lean ang                |          |                |           | le sensor-open or short circuit detected.   |                             |  |
|---------|---|----------|----------------|-----------|---|-----------------------------|--|
|         | Diagnostic monitoring code No.  Lean angle sensor |          |                |           | e sensor  |                             |  |
| Order   | Item/comp   | onents   | s and probat   | ole cause | Check or maintenance job  | Reinstatement method        |  |
| 1       | Connected • Lean ang • Main wire                  | le sens  |                | ler       | <ul> <li>Check the coupler for any pins that may have pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect it securely.</li> </ul>                | Turning the main switch ON. |  |
| 2       | Open or sho                                       | ort circ | uit in wire ha | rness.    | <ul> <li>Repair or replace if there is an open or short circuit.</li> <li>Between switch coupler and ECU coupler.</li> <li>(Black/Blue–Black/Blue)</li> <li>(Yellow/Green–Yellow/Green)</li> <li>(Blue–Blue)</li> </ul> |                             |  |
| 3       | Defective le                                      | an anç   | gle sensor     |           | <ul> <li>Execute the diagnostic monitoring mode. (Code No.08)</li> <li>Replace if defective.</li> <li>Refer to "CHECKING THE LEAN ANGLE SENSOR" on page 8-75.</li> </ul>  |                             |  |

| Fault   | Fault code No. 42 Sy  |  | Sym      | ptom         | A. No nor<br>B. Open o | A. No normal signals are received from the sp<br>B. Open or short circuit is detected in the neu  |  |
|---------|---|--|----------|--------------|------------------------|---|--|
| Diagn   | Diagnostic monitoring A 07 S <sub>I</sub>                                     |  | Speed se | Speed sensor |                        |   |  |
| code No |   |  | 21       | Neutral s    | Neutral switch         |   |  |
| Order   | Item/components and probable cause  |  |          |              | ble cause              | Check or maintenance job  | Reinstatement method   |
| A-1     | Installed condition of speed sensor   |  |          |              |                        | Check the installed area for looseness or pinching.   | Starting the engine, and inputting the   |
| A-2     | Connected state of connector.  Speed sensor coupler  Wire harness ECU coupler |  |          |              |                        | <ul> <li>Check the coupler for any pins that may have pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect it securely.</li> </ul>  | vehicle speed<br>signals by oper-<br>ating the motor-<br>cycle at a low<br>speed of 20–30<br>km/h. |
| A-3     | Open or short circuit in speed sensor lead.                                   |  |          |              |                        | <ul> <li>Repair or replace if there is an open or short circuit.</li> <li>Between sensor coupler and ECU coupler.</li> <li>(Blue-Blue)</li> <li>(White-White)</li> <li>(Black/Blue-Black/Blue)</li> </ul> |  |
| A-4     | Defective speed sensor.   |  |          |              |                        | <ul> <li>Execute the diagnostic monitoring mode. (Code No.07)</li> <li>Replace if defective.</li> <li>Refer to "CHECKING THE SPEED SENSOR" on page 8-77.</li> </ul>                                       |  |

| Fault o                          | Fault code No. 42 Syn   |           | Sym       | ptom     | A. No nor<br>B. Open o | mal signals are received from the sp<br>or short circuit is detected in the neu  | eed sensor.<br>tral switch.   |  |
|----------------------------------|---|-----------|-----------|----------|------------------------|--|-------------------------------|--|
| Diagnostic monitoring A 07 Speed |   | Speed ser | nsor      |          |                        |  |                               |  |
| code l                           | No.   |           | В         | 21       | Neutral sv             | Neutral switch   |                               |  |
| Order                            | Item/components and probable cause  |           |           |          |                        | Check or maintenance job   | Reinstatement method          |  |
| B-1                              | Installed co  | ndition   | of ne     | utral sv | vitch                  | Check the installed area for looseness or pinching.  | Turn the main switch to "ON". |  |
| B-2                              | Connected state of connector.  Neutral switch coupler  Wire harness ECU coupler |           |           |          |                        | <ul> <li>Check the coupler for any pins that may have pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect it securely.</li> </ul>                               |                               |  |
| B-3                              | Open or she lead.   | ort circ  | cuit in s | speed s  | sensor                 | <ul> <li>Repair or replace if there is an open or short circuit.</li> <li>Between relay unit coupler and ECU coupler (Black/Yellow–Black/Yellow)</li> <li>Between neutral switch and relay unit coupler (Sky blue–Sky blue)</li> </ul> |                               |  |
| B-4                              | Defective neutral switch  |           |           |          |                        | <ul> <li>Execute the diagnostic monitoring mode. (Code No.21)</li> <li>Replace if defective.</li> <li>Refer to "CHECKING THE SWITCHES" on page 8-63.</li> </ul>  |                               |  |
| B-5                              | Defective sl<br>location)   | nift dru  | ım (neı   | utral de | etection               | Replace if defective.  Refer to "TRANSMISSION" on page 5-64.   |                               |  |

| Fault o                            | code No.  | 43      | Symptom | Supply po  | ly power to the fuel injector and fuel pump is not normal.   |   |  |
|------------------------------------|---|---------|---------|------------|--|---|--|
| Diagnostic monitoring op Fuel syst |   |         |         | Fuel syste | stem voltage   |   |  |
| Order                              | r Item/components and probable cause  |         |         | ole cause  | Check or maintenance job   | Reinstatement method                          |  |
| 1                                  | Connected state of connector  Relay unit coupler  Fuel pump coupler  Fuel injector coupler  ECU coupler |         |         |            | <ul> <li>Check the coupler for any pins that may have pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect it securely.</li> </ul>   | Starting the engine and operating it at idle. |  |
| 2                                  | Open or short circuit in the wire harness.  |         |         |            | <ul> <li>Repair or replace if there is an open or short circuit.</li> <li>Between relay unit and ECU coupler (Red/Blue–Red/Blue)</li> <li>Between relay unit and fuse (EFI) (Brown/Yellow–Brown/Yellow)</li> <li>Between fuse (EFI) and battery (Brown/Yellow–Brown/Yellow)</li> </ul> |   |  |
| 3                                  | Faulty batte  | ry volt | age     |            | <ul> <li>Execute the diagnostic monitoring mode. (Code No. 09)</li> <li>Charge or replace if defective.</li> </ul>   |   |  |

| Fault code No. 44 Symptom         |                                    |  | Error is detected while reading or writing on EEPROM (CO adjustment valve). |                                     |   |   |
|-----------------------------------|------------------------------------|--|---|-------------------------------------|---|---|
| Diagnostic monitoring code No. 60 |                                    |  | 60  | EEPROM improper cylinder indication |   |   |
| Order                             | Item/components and probable cause |  |   | ole cause                           | Check or maintenance job  | Reinstatement method  |
| 1                                 | Malfunction in ECU                 |  |   |                                     | <ol> <li>Execute the diagnostic monitoring mode. (Code No. 60)</li> <li>Adjust the CO exhaust gas level, and set the abnormal exhaust gas level.</li> <li>Set until "0" is shown on the display.</li> <li>When defect cannot be repaired, replace the ECU.</li> </ol> | Turn the main<br>switch to "ON".<br>(When displayed<br>again, readjust<br>the exhaust gas.) |

| Fault                 | code No.               | 46       | Symptom                    | Power su   | pply to the FI system relay is not nor  | mal.  |
|-----------------------|------------------------|----------|----------------------------|------------|---|---|
| Diagnostic monitoring |                        |          |                            | _          |   |   |
| Order                 | Item/comp              | onents   | s and probal               | ole cause  | Check or maintenance job  | Reinstatement method                          |
| 1                     | Connected  • Wire harn |          | of connector<br>CU coupler |            | <ul> <li>Check the coupler for any pins that may have pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect it securely.</li> </ul>          | Starting the engine and operating it at idle. |
| 2                     | Faulty batte           | ery.     |                            |            | <ul> <li>Replace or charge the battery.</li> <li>Refer to "CHECKING AND<br/>CHARGING THE BATTERY" on<br/>page 8-68.</li> </ul>  |   |
| 3                     | Malfunction            | of the   | rectifier/regu             | llator     | <ul><li>Replace if defective.</li><li>Refer to "CHARGING SYSTEM" on page 8-11.</li></ul>  |   |
| 4                     | Open or sho            | ort circ | uit in the wire            | e harness. | Repair or replace if there is an open or short circuit.  Between battery and main switch. (Red–Red)  Between main switch and fuse (ignition) (Brown–Brown)  Between fuse (ignition) and ECU (Red/White–Red/White) |   |

| Fault o                        | ode No.                            | 50 | Symptom | Faulty ECU memory. (When this malfunction is detected in the ECU, the fault code number might not appear on the meter.) |                          |                            |  |
|--------------------------------|------------------------------------|----|---------|---|--------------------------|----------------------------|--|
| Diagnostic monitoring code No. |                                    |    | _       | _   |                          |                            |  |
| Order                          | Item/components and probable cause |    |         |   | Check or maintenance job | Reinstatement method       |  |
| 1                              | Malfunction in ECU                 |    |         |   | Replace the ECU.         | Turning the main switch ON |  |

| Fault o               | Fault code No. Er-1 Symptom No sign                           |       | No signal | s are received from the ECU. |  |  |
|-----------------------|---|-------|-----------|------------------------------|--|--|
| Diagnostic monitoring |   | _     | _         |                              |  |  |
| Order                 | Order Item/components and probable cause                      |       |           | ole cause                    | Check or maintenance job   | Reinstatement method   |
| 1                     | Connected state of connector  • Main wire harness ECU coupler |       |           | oler                         | <ul> <li>Check the coupler for any pins that may have pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect it securely.</li> </ul> | Reinstated if normal signal is received from the ECU when the main switch is turn to ON. |
| 2                     | Open or short circuit in wire harness lead                    |       |           |                              | <ul> <li>Repair or replace if there is an open or short circuit.</li> <li>Between meter coupler and ECU coupler</li> <li>(Yellow/Blue–Yellow/Blue)</li> </ul>  |  |
| 3                     | Malfunction in meter unit                                     |       |           |                              | Replace the meter unit.  |  |
| 4                     | Malfunction   | in EC | U         |                              | Replace the ECU.   |  |

|                                    |                        |          | No signals are received from the ECU within the specified duration. |           |  |  |
|------------------------------------|------------------------|----------|---|-----------|--|--|
| Diagno                             | ostic monito<br>No.    | ring     | _   | _         |  |  |
| Order Item/components and probable |                        |          |   | ole cause | Check or maintenance job   | Reinstatement method   |
| 1                                  | Connected  • Main wire | 0.00.0   | f connector<br>ss ECU coup  | oler      | <ul> <li>Check the coupler for any pins that may have pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect it securely.</li> </ul> | Reinstated if normal signal is received from the ECU when the main switch is turn to ON. |
| 2                                  | Open or sho            | ort circ | uit in wire ha  | rness     | <ul> <li>Repair or replace if there is an open or short circuit.</li> <li>Between meter coupler and ECU coupler (Yellow/Blue–Yellow/Blue)</li> </ul>   |  |
| 3                                  | Malfunction            | in me    | ter unit  |           | Replace the meter unit.  |  |
| 4                                  | Malfunction            | in EC    | U   |           | Replace the ECU.   |  |

| Fault code No. Er-3            |   | Symptom | Data from the ECU cannot be received corre |             | etly.  |  |
|--------------------------------|---|---------|--|-------------|--|--|
| Diagnostic monitoring code No. |   | _       | _  |             |  |  |
| Order                          | Item/components and probable cause                            |         |  | ole cause   | Check or maintenance job   | Reinstatement method   |
| 1                              | Connected state of connector  • Main wire harness ECU coupler |         |  | oler        | <ul> <li>Check the coupler for any pins that may have pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect it securely.</li> </ul> | Reinstated if normal signal is received from the ECU when the main switch is turn to ON. |
| 2                              | Open or short circuit in wire harness lead.                   |         |  | rness lead. | <ul> <li>Repair or replace if there is an open or short circuit.</li> <li>Between meter coupler and ECU coupler</li> <li>(Yellow/Blue–Yellow/Blue)</li> </ul>  |  |
| 3                              | Malfunction   | in me   | ter unit                                   |             | Replace the meter unit.  |  |
| 4                              | Malfunction in ECU  |         |  |             | Replace the ECU.   |  |

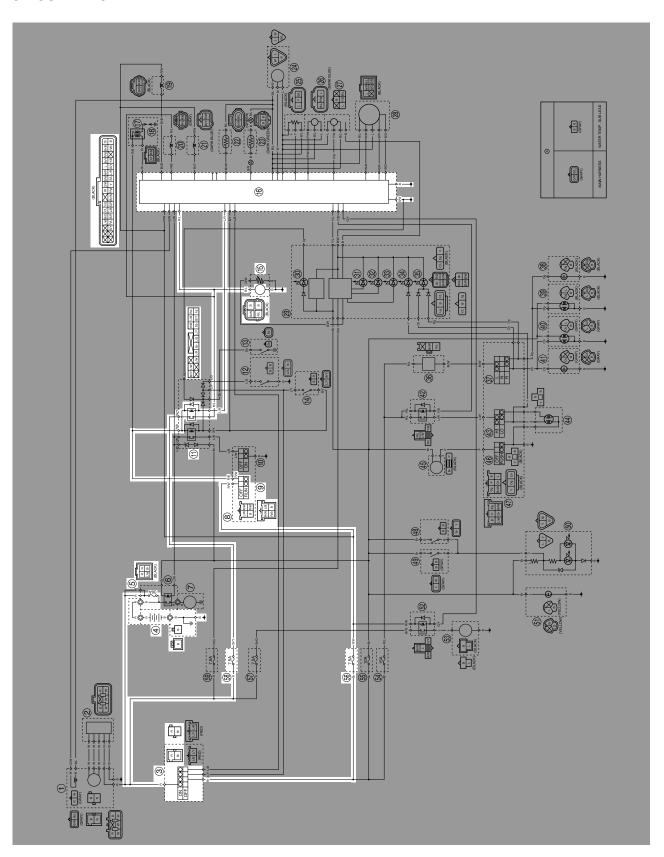
| Fault code No. Er-4            |   | Symptom | Non-registered data has been received from the meter. |             |  |  |
|--------------------------------|---|---------|---|-------------|--|--|
| Diagnostic monitoring code No. |   | _       | _   |             |  |  |
| Order                          | Item/components and probable cause                            |         |   | ole cause   | Check or maintenance job   | Reinstatement method   |
| 1                              | Connected state of connector  • Main wire harness ECU coupler |         |   | oler        | <ul> <li>Check the coupler for any pins that may have pulled out.</li> <li>Check the locking condition of the coupler.</li> <li>If there is a malfunction, repair it and connect it securely.</li> </ul> | Reinstated if normal signal is received from the ECU when the main switch is turn to ON. |
| 2                              | Open or short circuit in wire harness lead.                   |         |   | rness lead. | <ul> <li>Repair or replace if there is an open or short circuit.</li> <li>Between sensor coupler and ECU coupler</li> <li>(Yellow/Blue–Yellow/Blue)</li> </ul>   |  |
| 3                              | Malfunction   | in me   | ter unit  |             | Replace the meter unit.  |  |
| 4                              | Malfunction   | in EC   | U   |             | Replace the ECU.   |  |

EAS27580

## **FUEL PUMP SYSTEM**

EAS27590

## **CIRCUIT DIAGRAM**



## **FUEL PUMP SYSTEM**

- 3. Main switch
- 4. Battery
- 5. Main fuse
- 8. Right handlebar switch
- 9. Engine stop switch
- 11. Relay unit
- 15. Fuel pump
- 16. ECU
- 56. Ignition fuse
- 58. EFI fuse

Properly connect or repair the fuel pump

system's wiring.

EAS27600 TROUBLE SHOOTING The fuel pump fails to operate. Before troubleshooting, remove the following part(s): 1. Seat 2. Side cover (left/right) 3. Fuel tank 1. Check the fuse (Main fuse, ignition fuse, EFI fuse)  $NG \rightarrow$ Replace the fuse(s). Refer to "CHECKING THE FUSES" on page 8-67. OK↓ 2. Check the battery. Clean the battery terminals.  $NG \rightarrow$ Refer to "CHECKING AND CHARG- Recharge or replace the battery. ING THE BATTERY" on page 8-68. OK↓ 3. Check the main switch. Refer to "CHECKING THE  $NG \rightarrow$ Replace the main switch. SWITCHES" on page 8-63. OK↓ 4. Check the engine stop switch. Refer to "CHECKING THE  $NG \rightarrow$ Replace the right handlebar switch. SWITCHES" on page 8-63. OK↓ 5. Check the relay unit (fuel pump relay).  $\text{NG}{\rightarrow}$ Replace relay unit (fuel pump relay) Refer to "CHECKING THE SWITCHES" on page 8-63. OK↓ 6. Check fuel pressure Refer to "CHECKING THE PRES- $NG \rightarrow$ Replace the fuel pump. SURE REGULATOR" on page 7-6.

OK↓

8-55.

OK↓

harness connections.

7. Check the fuel pump system wire

Refer to "CIRCUIT DIAGRAM" on page

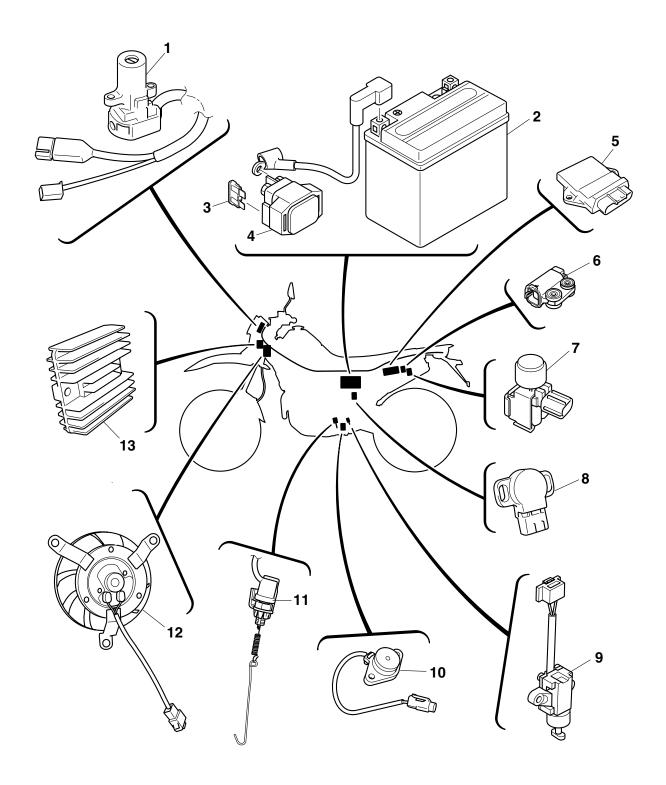
Replace the ECU.

 $NG \rightarrow$ 

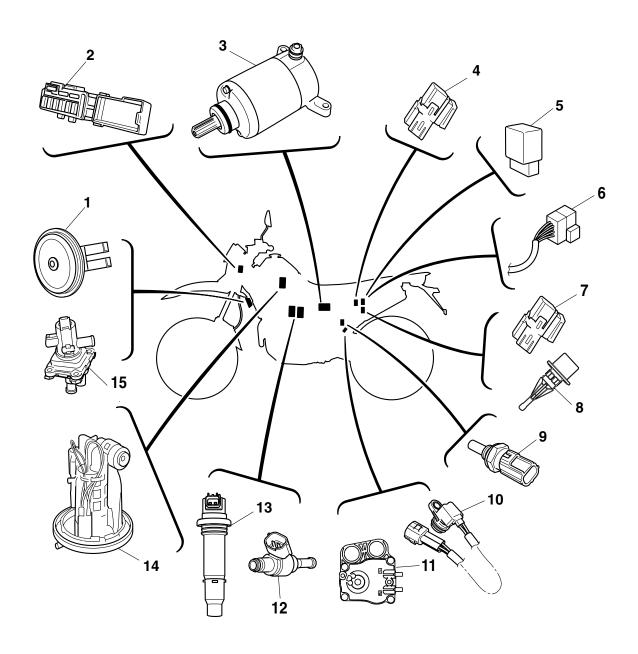
EAS27971

## **ELECTRICAL COMPONENTS**

EAS32D1011



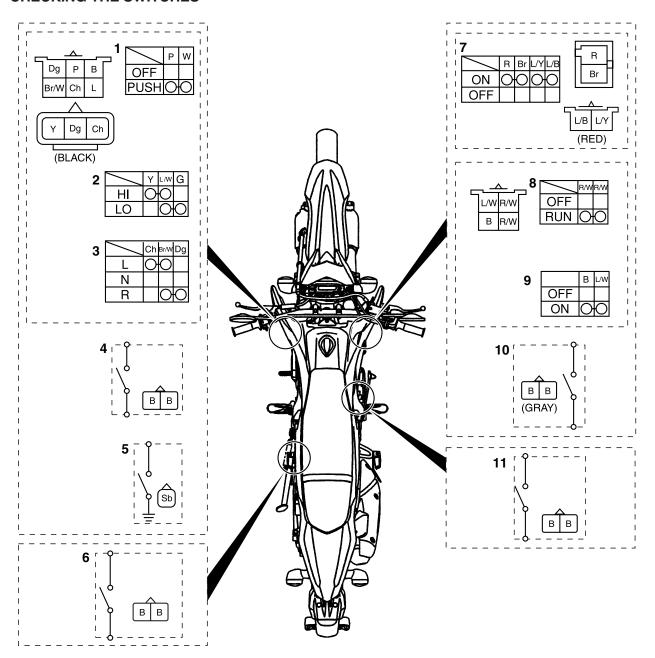
- 1. Main switch
- 2. Battery
- 3. Main fuse
- 4. Starter relay
- 5. ECU
- 6. Lean angle sensor
- 7. Intake solenoid
- 8. Throttle position sensor
- 9. Sidestand switch
- 10. Neutral switch
- 11. Rear brake switch
- 12. Fan motor
- 13. Rectifier/regulator



- 1. Horn
- 2. Fuse box
- 3. Starter motor
- 4. Radiator fan motor relay
- 5. Turn signal relay
- 6. Relay assembly
- 7. Headlight relay
- 8. Intake air temperature sensor
- 9. Coolant temperature sensor
- 10. Speed sensor
- 11. EXUP servo motor
- 12. Injector
- 13. Ignition coil
- 14. Fuel pump
- 15. Air cut-off valve

EAS27980

## **CHECKING THE SWITCHES**



- 1. Horn switch
- 2. Dimmer switch
- 3. Turn signal switch
- 4. Clutch switch
- 5. Neutral switch
- 6. Sidestand switch
- 7. Main switch
- 8. Engine stop switch
- 9. Start switch
- 10. Front brake switch
- 11. Rear brake switch

Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, check the wiring connections and if necessary, replace the switch.

## **CAUTION:**

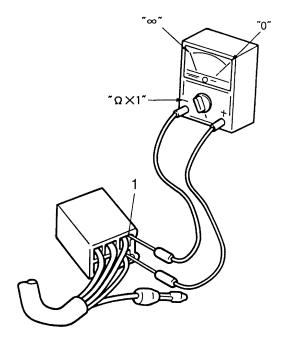
Never insert the tester probes into the coupler terminal slots "1". Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.



Pocket tester 90890-03112 Analog pocket tester YU-03112-C

#### NOTE:

- Before checking for continuity, set the pocket tester to "0" and to the " $\Omega \times 1$ " range.
- When checking for continuity, switch back and forth between the switch positions a few times.



The terminal connections for switches (e.g., main switch, engine stop switch) are shown in an illustration similar to the one on below.

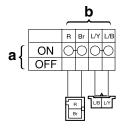
The switch positions "a" are shown in the far left column and the switch lead colors "b" are shown in the top row in the switch illustration.

#### NOTE

"O—O" indicates a continuity of electricity between switch terminals (i.e., a closed circuit at the respective switch position).

## The example illustration below shows that:

There is continuity between red and brown blue/yellow and blue/black when the switch is set to "ON".



8-65

EAS27990

## CHECKING THE BULBS AND BULB SOCKETS

Check each bulb and bulb socket for damage or wear, proper connections, and also for continuity between the terminals.

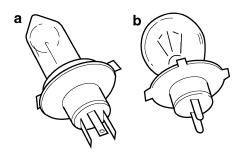
Damage/wear  $\rightarrow$  Repair or replace the bulb, bulb socket or both.

Improperly connected  $\to$  Properly connect. No continuity  $\to$  Repair or replace the bulb, bulb socket or both.

## Types of bulbs

The bulbs used on this vehicle are shown in the illustration on the left.

- Bulbs "a" and "b" are used for the headlights and usually use a bulb holder that must be detached before removing the bulb. The majority of these types of bulbs can be removed from their respective socket by turning them counterclockwise.
- Bulbs "c" is used for turn signal and can be removed from the socket by pushing and turning the bulb counterclockwise.





## Checking the condition of the bulbs

The following procedure applies to all of the bulbs.

- 1. Remove:
- Bulb

EWA13320

## **WARNING**

Since the headlight bulb gets extremely hot, keep flammable products and your hands

away from the bulb until it has cooled down.

ECA14380

## **CAUTION:**

- Be sure to hold the socket firmly when removing the bulb. Never pull the lead, otherwise it may be pulled out of the terminal in the coupler.
- Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb, and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly it with a cloth moistened with alcohol or lacquer thinner.

### 2. Check:

 Bulb (for continuity) (with the pocket tester)
 No continuity → Replace.



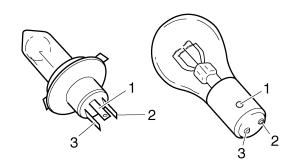
Pocket tester 90890-03112 Analog pocket tester YU-03112-C

### NOTE:

Before checking for continuity, set the pocket tester to "0" and to the " $\Omega \times$  1" range.

\*

- a. Connect the positive tester probe to terminal "1" and the negative tester probe to terminal "2", and check the continuity.
- b. Connect the positive tester probe to terminal "1" and the negative tester probe to terminal "3", and check the continuity.
- c. If either of the readings indicate no continuity, replace the bulb.



## Checking the condition of the bulb sockets

The following procedure applies to all of the bulb sockets.

- 1. Check:
- Bulb socket (for continuity) (with the pocket tester)
   No continuity → Replace.



Pocket tester 90890-03112 Analog pocket tester YU-03112-C

### NOTE:

Check each bulb socket for continuity in the same manner as described in the bulb section; however, note the following.

- a. Install a good bulb into the bulb socket.
- b. Connect the pocket tester probes to the respective leads of the bulb socket.
- c. Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.

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=AS28000

## **CHECKING THE FUSES**

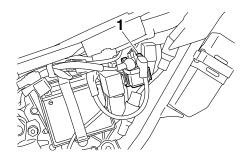
The following procedure applies to all of the fuses.

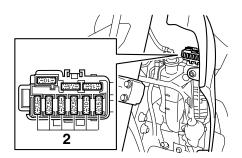
ECA13680

## **CAUTION:**

To avoid a short circuit, always set the main switch to "OFF" when checking or replacing a fuse.

- 1. Remove:
- Side cover (left)
- Air scoop (left)
  Refer to "GENERAL CHASSIS" on page 4-1.
- 2. Check:
  - Main fuse "1"
  - Fuse box "2"





 a. Connect the pocket tester to the fuse and check the continuity.

#### NOTE:

Set the pocket tester selector to " $\Omega \times 1$ ".



Pocket tester 90890-03112 Analog pocket tester YU-03112-C

b. If the pocket tester indicates "∞", replace the fuse.

- 3. Replace:
- Blown fuse
- a. Set the main switch to "OFF".
- Install a new fuse of the correct amperage rating.

\*

- c. Set on the switches to verify if the electrical circuit is operational.
- d. If the fuse immediately blows again, check the electrical circuit.

| Fuses              | Amperage rating | Q'ty |
|--------------------|-----------------|------|
| Main               | 30A             | 1    |
| Headlight          | 15A             | 1    |
| Signaling system   | 10A             | 1    |
| Ignition           | 7.5A            | 1    |
| EFI                | 7.5A            | 1    |
| Radiator fan motor | 7.5A            | 1    |
| Backup             | 7.5A            | 1    |
| Reserve            | 30A             | 1    |
| Reserve            | 15A             | 1    |
| Reserve            | 10A             | 1    |
| Reserve            | 7.5A            | 1    |

EWA13310

## **WARNING**

Never use a fuse with an amperage rating other than that specified. Improvising or using a fuse with the wrong amperage rating may cause extensive damage to the electrical system, cause the lighting and ignition systems to malfunction and could possibly cause a fire.

## 4. Install:

- Air scoop (left)
- Side cover (left)
   Refer to "GENERAL CHASSIS" on page 4-1.

EAS28030

## CHECKING AND CHARGING THE BATTERY

WA13290

## **WARNING**

Batteries generate explosive hydrogen gas and contain electrolyte which is made of poisonous and highly caustic sulfuric acid. Therefore, always follow these preventive measures:

- Wear protective eye gear when handling or working near batteries.
- Charge batteries in a well-ventilated area.
- Keep batteries away from fire, sparks or open flames (e.g., welding equipment, lighted cigarettes).
- DO NOT SMOKE when charging or handling batteries.
- KEEP BATTERIES AND ELECTROLYTE

### OUT OF REACH OF CHILDREN.

 Avoid bodily contact with electrolyte as it can cause severe burns or permanent eye injury.

## FIRST AID IN CASE OF BODILY CONTACT: EXTERNAL

- Skin Wash with water.
- Eyes Flush with water for 15 minutes and get immediate medical attention.

#### **INTERNAL**

 Drink large quantities of water or milk followed with milk of magnesia, beaten egg or vegetable oil. Get immediate medical attention.

ECA13660

## **CAUTION:**

- This is a sealed battery. Never remove the sealing caps because the balance between cells will not be maintained and battery performance will deteriorate.
- Charging time, charging amperage and charging voltage for an MF battery are different from those of conventional batteries. The MF battery should be charged as explained in the charging method illustrations. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.

## NOTE:

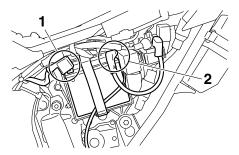
Since MF batteries are sealed, it is not possible to check the charge state of the battery by measuring the specific gravity of the electrolyte. Therefore, the charge of the battery has to be checked by measuring the voltage at the battery terminals.

- 1. Remove:
  - Side cover (left)
     Refer to "GENERAL CHASSIS" on page 4-1.
- 2. Disconnect:
  - Battery band
  - Battery leads (from the battery terminals)

FCA13640

### **CAUTION:**

First, disconnect the negative battery lead "1", and then positive battery lead "2".



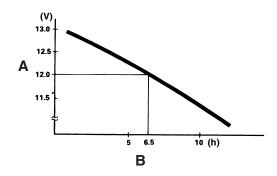
- 3. Remove:
  - Battery
- 4. Check:
- Battery charge
- a. Connect a pocket tester to the battery terminals.

Positive tester probe → positive battery terminal Negative tester probe → negative battery terminal

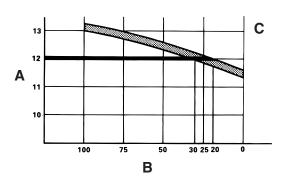
#### NOTE:

- The charge state of an MF battery can be checked by measuring its open-circuit voltage (i.e., the voltage when the positive battery terminal is disconnected).
- No charging is necessary when the open-circuit voltage equals or exceeds 12.8 V.
- b. Check the charge of the battery, as shown in the charts and the following example.

Example
Open-circuit voltage = 12.0 V
Charging time = 6.5 hours
Charge of the battery = 20–30%



- A. Open-circuit voltage
- B. Charging time



- A. Open-circuit voltage
- B. Charge of the battery
- C. Temperature 20°C

## 5. Charge:

Battery

• Dallel

**M** WARNING

Do not quick charge a battery.

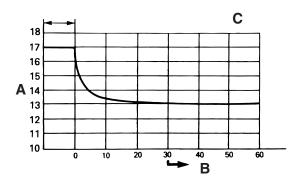
ECA13670

## **CAUTION:**

- Never remove the MF battery sealing caps.
- Do not use a high-rate battery charger since it forces a high-amperage current into the battery quickly and can cause battery overheating and battery plate damage.
- If it is impossible to regulate the charging current on the battery charger, be careful not to overcharge the battery.
- When charging a battery, be sure to remove it from the vehicle. (If charging has to be done with the battery mounted on the vehicle, disconnect the negative battery lead from the battery terminal.)
- To reduce the chance of sparks, do not plug in the battery charger until the battery charger leads are connected to the battery.
- Before removing the battery charger lead clips from the battery terminals, be sure to turn off the battery charger.
- Make sure the battery charger lead clips are in full contact with the battery terminal and that they are not shorted. A corroded battery charger lead clip may generate heat in the contact area and a weak clip spring may cause sparks.
- If the battery becomes hot to the touch at any time during the charging process, disconnect the battery charger and let the bat-

tery cool before reconnecting it. Hot batteries can explode!

 As shown in the following illustration, the open-circuit voltage of an MF battery stabilizes about 30 minutes after charging has been completed. Therefore, wait 30 minutes after charging is completed before measuring the open-circuit voltage.



- A. Open-circuit voltage
- B. Charging the open-circuit voltage
- C. Temperature 20°C

# Charging method using a variable-current (voltage) charger

a. Measure the open-circuit voltage prior to charging.

NOTE:

Voltage should be measured 30 minutes after the machine is stopped.

b. Connect a charged and AMP meter to the battery and start charging.

NOTE:

Set the charging voltage at 16–17 V.If the setting is lower, charging will be insufficient. If too high, the battery will be over-charged.

 Make sure that the current is higher than the standard charging current written on the battery.

NOTE:

If the current is lower than the standard charging current written on the battery, set the charging voltage adjust dial at 20–24 V and monitor the amperage for 3–5 minutes to check the battery.

Reach the standard charging current Battery is good.

Does not reach the standard charging current

Replace the battery.

- d. Adjust the voltage so that the current is at the standard charging level.
- e. Set the time according to the charging time suitable for the open-circuit voltage.
   Refer to "Battery condition checking steps".
- f. If charging requires more than 5 hours, it is advisable to check the charging current after a lapse of 5 hours. If there is any change in the amperage, readjust the voltage to obtain the standard charging current.
- g. Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

## \*\*\*\*\*

12.8 V or more --- Charging is complete. 12.7 V or less --- Recharging is required. Under 12.0 V --- Replace the battery.

## Charging method using a constant voltage charger

a. Measure the open-circuit voltage prior to charging.

NOTE:

Voltage should be measured 30 minutes after the machine is stopped.

- b. Connect a charger and AMP meter to the battery and start charging.
- Make sure that the current is higher than the standard charging current written on the battery.

### NOTE:

If the current is lower than the standard charging current written on the battery, This type of battery charger cannot charge the MF battery. A variable voltage charger is recommended.

d. Charge the battery until the battery's charging voltage is 15 V.

NOTE:

Set the charging time at 20 hours (maximum).

e. Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

\_\_\_\_

12.8 V or more --- Charging is complete. 12.7 V or less --- Recharging is required. Under 12.0 V --- Replace the battery.

- 6. Check:
  - Battery terminals
     Dirt → Clean with a wire brush.
     Loose connection → Connect properly.
- 7. Install:
  - Battery
- 8. Connect:
  - Battery leads (to the battery terminals)
- 9. Lubricate:
  - Battery terminals



Recommended lubricant Dielectric grease

## 10.Install:

- Battery band
- 11.Install:
- Side cover (left)
  Refer to "GENERAL CHASSIS" on page 4-1.

EAS28040

### **CHECKING THE RELAYS**

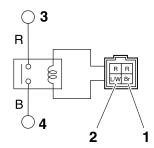
Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, replace the relay.



Pocket tester 90890-03112 Analog pocket tester YU-03112-C

- 1. Disconnect the relay from the wire harness.
- 2. Connect the pocket tester ( $\Omega \times 1$ ) and battery (12 V) to the relay terminal as shown. Check the relay operation.
  - Out of specification  $\rightarrow$  Replace.

## Starter relay

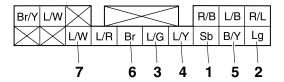


- 1. Positive battery terminal
- 2. Negative battery terminal
- 3. Positive tester probe
- 4. Negative tester probe



Result Continuity (between "3" to "4")

Relay unit (starting circuit cut-off relay)

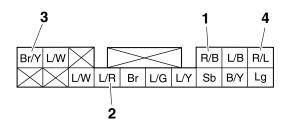


- 1. Positive battery terminal
- 2. Negative battery terminal
- 3. Positive tester probe
- 4. Negative tester probe



Result Continuity (between "3" to "4")

## Relay unit (fuel pump)

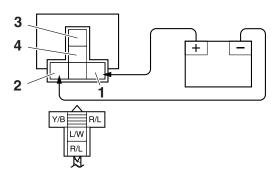


- 1. Positive battery terminal
- 2. Negative battery terminal
- 3. Positive tester probe
- 4. Negative tester probe



Result Continuity (between "3" to "4")

## **Headlight relay**



- 1. Positive battery terminal
- 2. Negative battery terminal
- 3. Positive tester probe
- 4. Negative tester probe



Result Continuity (between "3" to "4")

\_\_\_\_\_

## Checking the turn signal relay

- a. Check:
  - Turn signal relay input voltage
     Off specification →Repair wire harness connection failure from main switch to turn signal relay coupler



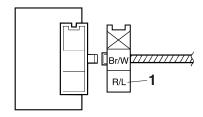
Turn signal relay input voltage DC 12V

 Connect the pocket tester (DC 20 V) to the turn signal relay terminal.



Pocket tester 90890-03112 Analog pocket tester YU-03112-C

Tester positive probe Red/Blue "1" Negative tester probe Ground



- b. Turn the main switch to "ON".
- c. Measure turn signal relay applied voltage.

#### d. Check:

Turn signal relay output voltage
 Out of specification → Replace the defective
 part (s).



Turn signal relay output voltage DC 12V

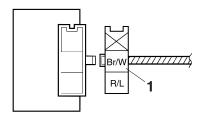
a. Connect the pocket tester (DC 20 V) to the turn signal relay terminal.

\*



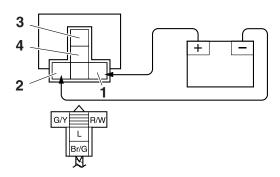
Pocket tester 90890-03112 Analog pocket tester YU-03112-C

Tester positive probe Brown/White termnals "1" Negative tester probe Ground



- b. Turn the main switch to "ON".
- c. Measure turn signal relay applied voltage.

## Radiator fan motor relay



- 1. Positive battery terminal
- 2. Negative battery terminal
- 3. Positive tester probe
- 4. Negative tester probe



Result
Continuity
(between "3" to "4")

EAS28050

### CHECKING THE DIODE

- 1. Check:
- Diode

Out of specification  $\rightarrow$  Replace.



Pocket tester 90890-03112 Analog pocket tester YU-03112-C

NOTE:

The pocket tester and the analog pocket tester readings are shown in the following table.



## Continuity

Tester positive lead → Sky blue "1"

Tester negative lead → Light green "2"

No continuity

Tester positive lead → Light green "2"

Tester negative lead → Sky blue "1"

Continuity

Tester positive lead → Blue/ Green "3"

Tester negative lead  $\rightarrow$  Blue/Yellow "4"

No continuity

Tester positive lead  $\rightarrow$  Blue/Yellow "4"

Tester negative lead  $\rightarrow$  Blue/ Green "3"

Continuity

Tester positive lead → Sky blue "1"

Tester negative lead → Blue/Yellow "4"

No continuity

Tester positive lead  $\rightarrow$  Blue/Yellow "4"

Tester negative lead  $\rightarrow$  Sky blue "1"

Continuity

Tester positive lead → Sky blue "1"

Tester negative lead → Black/ Yellow "5"

No continuity

Tester positive lead → Black/ Yellow "5"

Tester negative lead → Sky blue "1"

Continuity

Tester positive lead → Brown "6"

Tester negative lead → Blue/ White "7"

No continuity

Tester positive lead  $\rightarrow$  Blue/ White "7"

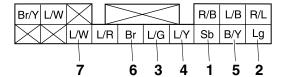
Tester negative lead  $\rightarrow$  Brown "6"

 a. Disconnect the starting circuit cut-off relay from the wire harness.

\*

b. Connect the pocket tester ( $\Omega \times 1$ ) to the starting circuit cut-off relay coupler as shown.

- c. Check the diode for continuity.
- d. Check the diode for no continuity.



FAS28930

#### CHECKING THE IGNITION SPARK GAP

- 1. Check:
- Ignition spark gap
   Out of specification → Perform the ignition
   system troubleshooting, starting with step \*.
   Refer to "TROUBLESHOOTING" on page
   8-3.



Minimum ignition spark gap 6.0 mm (0.24 in)

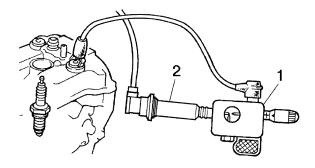
## NOTE:

If the ignition spark gap is within specification, the ignition system circuit is operating normally.

- a. Disconnect the spark plug cap from the spark plug.
- b. Connect the ignition checker "1" as shown.



Ignition checker 90890-06754 Opama pet-4000 spark checker YM-34487



- 1. Ignition checker
- 2. Spark plug cap

- c. Turn the main switch to "ON" and engine stop switch to "O".
- d. Measure the ignition spark gap "a".
- e. Crank the engine by pushing the start switch "(s)" and gradually increase the spark gap until a misfire occurs.

EAS2809

## CHECKING THE IGNITION COIL

- 1. Check:
- Primary coil resistance
   Out of specification → Replace.



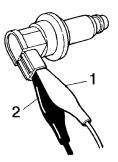
Primary coil resistance 1.19–1.61  $\Omega$ 

- a. Disconnect the ignition coil lead coupler from wire harness.
- b. Connect the pocket tester ( $\Omega \times 1$ ) to the ignition coil as shown.



Pocket tester 90890-03112 Analog pocket tester YU-03112-C

Tester positive probe Red/Black termainal "1" Negative tester probe Orange terminal "2"



c. Measure the primary coil resistance.

\_\_\_\_

- 2. Check:
- Secondary coil resistance
   Out of specification → Replace.



Secondary coil resistance 8.50–11.50 kΩ

- a. Disconnect the spark plug cap from the ignition coil.
- b. Connect the pocket tester ( $\Omega \times 1k$ ) to the ignition coil as shown.



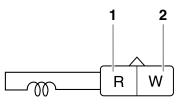
Pocket tester 90890-03112 Analog pocket tester YU-03112-C

Positive tester probe Red/Black "1" Negative tester probe Spark plug lead "2"



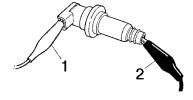
Pocket tester 90890-03112 Analog pocket tester YU-03112-C

Positive tester probe Red "1" Negative tester probe White "2"



b. Measure the crankshaft position sensor resistance.

\_\_\_\_





c. Measure the secondary coil resistance.

EAS32D1002

## CHECKING THE CRANKSHAFT POSITION SENSOR

- 1. Disconnect:
- Crankshaft position sensor coupler (from the wire harness)
- 2. Check:
  - Crankshaft position sensor resistance
     Out of specification → Replace the crankshaft position sensor.



Crankshaft position sensor resistance 248–372  $\Omega$  (R–W)

a. Connect the pocket tester ( $\Omega \times 100$ ) to the crankshaft position sensor coupler as shown.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

EAS28130

### CHECKING THE LEAN ANGLE SENSOR

- 1. Remove:
  - Lean angle sensor (from the bracket.)
- 2. Check:
  - Lean angle sensor out put voltage
     Out of specification → Replace.



Lean angle sensor out put voltage Less than 65° "a" 0.4–1.4V More than 65° "b" 3.7–4.4V

- a. Connect the lean angle sensor coupler to the wireharness.
- b. Connect the pocket tester (DC 20 V) to the lean angle sensor coupler as shown.



Pocket tester 90890-03112 Analog pocket tester YU-03112-C

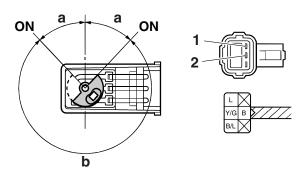
Positive tester probe

**Negative tester probe** 

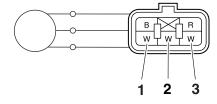
White "2"

White "3"

Tester positive probe Blue "1" Negative tester probe Yellow/Green "2"



- c. Incline the lean angle sensor.
- d. Measure the lean angle sensor out put voltage.



b. Measure the stator coil resistance.

EAS28150

### CHECKING THE STATOR COIL

- 1. Disconnect:
- Stator coil coupler (from the wire harness)
- 2. Check:
- Stator coil resistance
   Out of specification → Replace the stator coil.



Stator coil resistance 0.168–0.252  $\Omega$  (W-W)

a. Connect the pocket tester ( $\Omega \times 1$ ) to the stator coil coupler as shown.



Pocket tester 90890-03112 Analog pocket tester YU-03112-C

Positive tester probe White "1" Negative tester probe White "2"

Positive tester probe White "1" Negative tester probe White "3"

EAS28170

## CHECKING THE RECTIFIER/REGULATOR

\_\_\_\_

- 1. Check:
- Charging voltage
   Out of specification → Replace the rectifier/ regulator.



Charging voltage 14 V at 5000 r/min

a. Set the digital tachometer to the ignition coil of cylinder #1.

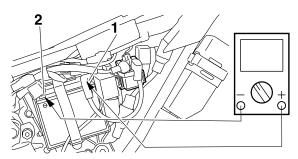
\*\*\*\*\*\*\*\*\*\*

b. Connect the pocket tester (DC 20 V) to the rectifier/regulator coupler as shown.



Pocket tester 90890-03112 Analog pocket tester YU-03112-C

Positive tester probe
Positive battery terminal "1"
Negative tester probe
Negative battery terminal "2"



- c. Start the engine and let it run at approximately 5000 r/min.
- d. Measure the charging voltage.

EAS28180

## **CHECKING THE HORN**

- 1. Check:
- Horn resistance
   Out of specification → Replace.



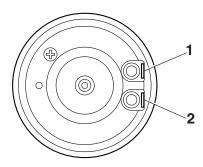
Horn resistance 1.01–1.11  $\Omega$  at 20°C (68°F)

- a. Disconnect the horn leads from the horn terminals.
- b. Connect the pocket tester ( $\Omega \times 1$ ) to the horn terminals.



Pocket tester 90890-03112 Analog pocket tester YU-03112-C

Positive tester probe Horn terminal "1" Negative tester probe Horn terminal "2"



\_\_\_\_

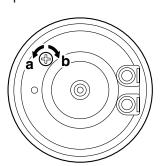
c. Measure the horn resistance.

- 2. Check:
  - Horn sound
     Faulty sound → Adjust or replace.

a. Connect a battery (12 V) to the horn.

b. Turn the adjusting screw in direction "a" or "b" until the specified horn sound is obtained.

\*\*\*\*\*\*\*\*\*\*



EAS28240

## **CHECKING THE SPEED SENSOR**

- 1. Check:
  - Speed sensor output voltage
     Out of specification → Replace.



Output voltage reading cycle 0 V-5 V-0 V-5 V-0 V

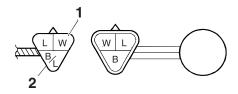
 Connect the pocket tester (DC 20 V) to the speed sensor coupler (wire harness side) as shown.

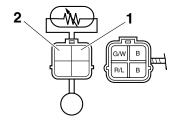
\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*



Pocket tester 90890-03112 Analog pocket tester YU-03112-C

Positive tester probe White "1" Negative tester probe Black/Blue "2"





- b. Set the main switch to "ON".
- c. Elevate the rear wheel and slowly turn it.
- d. Measure the voltage (DC 5 V) of white and black/blue. With the front wheel slowly rotating, voltage alternates between 0 V and 5 V.

\_\_\_\_\_

EAS32D1012

## CHECKING THE FUEL SENDER (FUEL PUMP)

Drain the gasoline.

- 1. Disconnect:
- Fuel pump coupler (from the fuel pump)
- 2. Remove:
  - Fuel pump (from the fuel pump tank)
- 3. Check:
  - $\bullet$  Fuel sender resistance Out of specification  $\to$  Replace the fuel pump.



Fuel sender resistance 0.94–1.88  $k\Omega$ 

a. Connect the pocket tester ( $k\Omega \times 1$ ) to the fuel sender as shown.



Pocket tester 90890-03112 Analog pocket tester YU-03112-C

Positive tester probe Green/White "1" Negative tester probe Black "2" b. Measure the resistance of the fuel sender.

EAC0000

## CHECKING THE COOLANT TEMPERATURE SENSOR

- 1. Remove:
- Coolant temperature sensor
   Refer to "THERMOSTAT" on page 6-4.

EWA14130

## **⚠** WARNING

- Handle the coolant temperature sensor with special care.
- Never subject the coolant temperature sensor to strong shocks. If the coolant temperature sensor is dropped, replace it.
- 2. Check:
- Coolant temperature sensor resistance
   Out of specification → Replace.



Resistance 20°C (68°F) 2.32–2.59 k $\Omega$  Resistance 80°C (176°F) 310–326  $\Omega$ 

a. Connect the pocket tester ( $\Omega \times 100$ ) to the coolant temperature sensor as shown.

\*



Pocket tester 90890-03112 Analog pocket tester YU-03112-C

Positive tester probe Black "1" Negative tester probe Black "2"

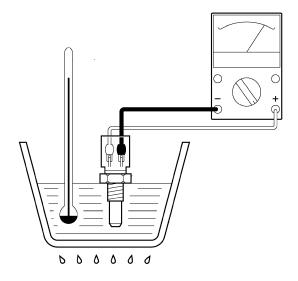
B B

b. Immerse the coolant temperature sensor in a container filled with coolant.

### NOTE:

Make sure the coolant temperature sensor terminals do not get wet.

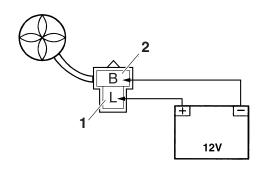
- c. Place a thermometer in the coolant.
- d. Slowly heat the coolant, and then let it cool to the specified temperature indicated in the table
- e. Check the coolant temperature sensor for continuity at the temperatures indicated in the table.



from the wire harness.

b. Connect the battery (DC 12 V) as shown.

Positive tester probe Blue "1" Negative tester probe Black "2"



c. Measure the radiator fan motor movement.

EAS2830

## CHECKING THE THROTTLE POSITION SENSOR

- 1. Check:
- Throttle position sensor
- a. Connect the pocket tester (DC 20 V) to the throttle position sensor as shown.

\*



Pocket tester 90890-03112 Analog pocket tester YU-03112-C

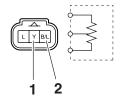
Tester positive lead → Yellow "1"
Tester negative lead → Black/Blue "2"

EAS2825

#### CHECKING THE RADIATOR FAN MOTOR

- 1. Check:
- Radiator fan motor Faulty/rough movement → Replace.

a. Disconnect the radiator fan motor coupler



b. While slowly turning the throttle position sen-

sor shaft, check that the throttle position sensor voltage is within the specified range.

The voltage does not change or it changes abruptly → Replace the throttle position sensor.



Throttle position sensor output voltage 0.6-5.0 V

### CHECKING THE EXUP SERVO MOTOR

\*

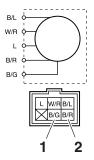
\_\_\_\_

- 1. Check:
- EXUP servo motor operation Out of specification  $\rightarrow$  Replace.

a. Disconnect the EXUP cables from the EXUP servo motor pulley.

- b. Disconnect the EXUP servo motor coupler from the wire harness.
- c. Connect the battery leads to the EXUP servo motor coupler as shown.

Positive battery lead Black/Green "1" **Negative battery lead** Black/Red "2"



d. Check that the EXUP servo motor pulley rotates several times.

ECA14390

## **CAUTION:**

To prevent damaging the EXUP servomotor, perform this test within a few seconds of connecting the battery.

FAS28410

## CHECKING THE INTAKE AIR PRESSURE SENSOR

- 1. Check:
  - Intake air pressure sensor output voltage Out of specification  $\rightarrow$  Replace.



Intake air pressure sensor output voltage

3.75-4.25V

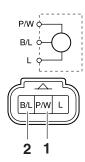
a. Connect the pocket tester (DC 20 V) to the intake air pressure sensor coupler (wire harness side) as shown.

\*



Digital circuit tester 90890-03174 Model 88 Multimeter with tachometer YU-A1927

Positive tester probe Pink/White "1" **Negative tester probe** Black/Blue "2"



- b. Set the main switch to "ON".
- c. Measure the intake air pressure sensor output voltage.

\_\_\_\_

EAS28420

## CHECKING THE INTAKE AIR TEMPERATURE SENSOR

- 1. Remove:
- Intake air temperature sensor (from the air filter case.)

## **WARNING**

- Handle the intake air temperature sensor with special care.
- Never subject the intake air temperature

sensor to strong shocks. If the intake air temperature sensor is dropped, replace it.

- 2. Check:
  - Intake air temperature sensor resistance
     Out of specification → Replace.



Intake air temperature sensor resistance

2.21-2.69 kΩ 20°C

a. Connect the pocket tester ( $\Omega \times 1$ k) to the intake air temperature sensor terminal as shown.

\*



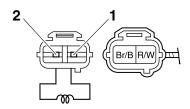
Digital circuit tester
90890–03174
Model 88 Multimeter with tachometer
YU-A1927

Positive tester probe Brown/White "1" Negative tester probe Black/Blue "2"



Pocket tester 90890-03112 Analog pocket tester YU-03112-C

Tester positive lead Red/White "1" Tester negative lead Brown/Black "2"



\*\*\*\*

c. Measure the intake solenoid resistance.

Br/W O O B/L

Br/W B/L

1 2

EAS32D1013

## **CHECKING THE INTAKE SOLENOID**

- 1. Check:
- Intake solenoid resistance
   Out of specification → Replace.



Intake solenoid resistance 42–48Ω 20°C

- a. Disconnect the intake solenoid coupler from the wire harness.
- b. Connect the pocket tester ( $\Omega \times 10$ ) to the intake solenoid terminal as shown.

## **TROUBLESHOOTING**

| TROUBLESHOOTING                        | 9-1 |
|--|-----|
| GENERAL INFORMATION                    | 9-1 |
| STARTING FAILURES                      | 9-1 |
| INCORRECT ENGINE IDLING SPEED          | 9-1 |
| POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE | 9-2 |
| FAULTY GEAR SHIFTING                   |     |
| SHIFT PEDAL DOES NOT MOVE              | 9-2 |
| JUMPS OUT OF GEAR                      |     |
| FAULTY CLUTCH                          | 9-2 |
| OVERHEATING                            |     |
| OVERCOOLING                            | 9-3 |
| POOR BRAKING PERFORMANCE               |     |
| FAULTY FRONT FORK LEGS                 | 9-3 |
| UNSTABLE HANDLING                      | 9-3 |
| FAULTY LIGHTING OR SIGNALING SYSTEM    | 9-3 |

EAS28450

#### TROUBLESHOOTING

EAS28460

## **GENERAL INFORMATION**

NOTE:

The following guide for troubleshooting does not cover all the possible causes of trouble. It should be helpful, however, as a guide to basic trouble-shooting. Refer to the relative procedure in this manual for checks, adjustments, and replacement of parts.

FAS28470

## STARTING FAILURES Engine

- 1. Cylinder (s) and cylinder head (s)
- Loose spark plug
- Loose cylinder head or cylinder
- Damaged cylinder head gasket
- Damaged cylinder gasket
- Worn or damaged cylinder
- Incorrect valve clearance
- Improperly sealed valve
- Incorrect valve-to-valve-seat contact
- Incorrect valve timing
- Faulty valve spring
- Seized valve
- 2. Piston (s) and piston ring (s)
  - Damaged, worn or fatigued piston ring
  - Seized piston ring
  - Seized or damaged piston
- 3. Air filter
  - Improperly installed air filter
  - Clogged air filter element
- 4. Crankcase and crankshaft
- Improperly assembled crankcase
- Seized crankshaft

## **Fuel system**

- 1. Fuel tank
- Empty fuel tank
- Deteriorated or contaminated fuel
- 2. Fuel pump
- Faulty fuel pump
- 3. Fuel cock
  - Clogged or damaged fuel hose
- 4. Throttle body
- Clogged pilot air passage

## **Electrical system**

- 1. Battery
- Discharged battery
- Faulty battery
- 2. Fuse (s)
- Blown, damaged or incorrect fuse

- Improperly installed fuse
- 3. Spark plug (s)
  - Incorrect spark plug gap
  - Incorrect spark plug heat range
  - Fouled spark plug
  - Worn or damaged electrode
  - Worn or damaged insulator
- 4. Ignition coil (s)
  - Cracked or broken ignition coil body
  - Broken or shorted primary or secondary coils
- 5. Ignition system
  - ECU failure.
- Faulty crankshaft position sensor
- Broken generator rotor woodruff key
- 6. Switches and wiring
  - Defective lean angle sensor
  - Faulty main switch
  - Faulty engine stop switch
- Broken or shorted wiring
- Faulty neutral switch
- Faulty start switch
- Faulty sidestand switch
- Faulty clutch switch
- Improperly grounded circuit
- Loose connections
- 7. Starting system
- Faulty starter motor
- Faulty starter relay
- Faulty starting circuit cut-off relay
- Faulty starter clutch

FAS28490

## INCORRECT ENGINE IDLING SPEED Engine

- 1. Cylinder (s) and cylinder head (s)
- Incorrect valve clearance
- Damaged valve train components
- 2. Air filter
  - Clogged air filter element

## **Fuel system**

- 1. Throttle body
- Air intake in throttle body joint
- Improper throttle cable free play
- Faulty air induction system

## **Electrical system**

- 1. Battery
- Discharged battery
- Faulty battery
- 2. Spark plug (s)
  - Incorrect spark plug gap
  - Incorrect spark plug heat range
  - Fouled spark plug
  - Worn or damaged electrode
- Worn or damaged insulator

- Faulty spark plug cap
- 3. Ignition coil (s)
- Faulty ignition coil
- Cracked or broken ignition coil
- 4. Ignition system
- ECU failure.
- Faulty crankshaft position sensor

## POOR MEDIUM-AND-HIGH-SPEED **PERFORMANCE**

Refer to "STARTING FAILURES" on page 9-1.

## **Engine**

- 1. Air filter
- Clogged air filter element

## **Fuel system**

- 1. Fuel pump
- Faulty fuel pump
- 2. Throttle body
  - Defective throttle body
- 3. ECU
  - ECU failure.

FAS28530

## **FAULTY GEAR SHIFTING** Shifting is difficult

Refer to "Clutch drags".

## SHIFT PEDAL DOES NOT MOVE Shift shaft

## Bent shift shaft

- Shift drum and shift forks Foreign object in a shift drum groove
- Seized shift fork
- Bent shift fork guide bar

## **Transmission**

- Seized transmission gear
- Foreign object between transmission gears
- Improperly assembled transmission

## **JUMPS OUT OF GEAR** Shift shaft

- Incorrect shift pedal position
- Improperly returned stopper lever

### Shift forks

Worn shift fork

### Shift drum

- Incorrect axial play
- Worn shift drum groove

## **Transmission**

Worn gear dog

EAS28560

## **FAULTY CLUTCH** Clutch slips

- 1. Clutch
- Improperly assembled clutch
- Loose or fatigued clutch spring
- Worn friction plate
- Worn clutch plate
- 2. Engine oil
  - Incorrect oil level
  - Incorrect oil viscosity (low)
  - Deteriorated oil

## Clutch drags

- 1. Clutch
- Unevenly tensioned clutch springs
- Warped pressure plate
- Bent clutch plate
- Swollen friction plate
- Bent clutch push rod
- Broken clutch boss
- Burnt primary driven gear bushing
- 2. Engine oil
  - Incorrect oil level
- Incorrect oil viscosity (high)
- Deteriorated oil

EAS28590

## **OVERHEATING**

### **Engine**

- Cylinder head (s) and piston (s)
  - Heavy carbon buildup
- 2. Engine oil
- Incorrect oil level
- Incorrect oil viscosity
- Inferior oil quality

## Cooling system

- 1. Coolant
  - Low coolant level
- Radiator
- Damaged or leaking radiator
- Faulty radiator cap
- Bent or damaged radiator fin
- 3. Water pump
- Damaged or faulty water pump
- Faulty thermostat
- Damaged fan motor or disconnected coupler
- Damaged hose
- Improperly connected hose
- Damaged pipe
- Improperly connected pipe

## **Fuel system**

- 1. Throttle body
- Air intake in throttle body joint
- 2. Air filter

Clogged air filter element

## Chassis

- 1. Brake (s)
- Dragging brake

## **Electrical system**

- 1. Spark plug (s)
- Incorrect spark plug gap
- Incorrect spark plug heat range
- 2. Ignition system
  - ECU failure
  - Faulty radiator fan motor relay
  - Faulty coolant temperature sensor

#### EAS28610

## OVERCOOLING Cooling system

- 1. Thermostat
- Thermostat stays open

#### EAS28620

#### POOR BRAKING PERFORMANCE

- Worn brake pad
- Worn brake disc
- Air in hydraulic brake system
- Leaking brake fluid
- Defective master cylinder kit
- Faulty brake caliper kit
- Faulty brake caliper seal
- Loose union bolt
- Damaged brake hose
- Oil or grease on the brake disc
- Oil or grease on the brake pad
- Incorrect brake fluid level

#### EAS2866

## FAULTY FRONT FORK LEGS Leaking oil

- Bent, damaged or rusty inner tube
- Cracked or damaged outer tube
- Improperly installed oil seal
- Damaged oil seal lip
- Incorrect oil level (high)
- Loose damper rod assembly bolt
- Damaged damper rod assembly bolt copper washer
- Cracked or damaged cap bolt O-ring

## Malfunction

- Bent or damaged inner tube
- Bent or damaged outer tube
- Damaged fork spring
- Bent or damaged damper rod
- Incorrect oil viscosity
- Incorrect oil level

#### FAS28690

## **UNSTABLE HANDLING**

- 1. Handlebar
- Bent or improperly installed handlebar
- 2. Steering head components
- Improperly installed upper bracket
- Improperly installed lower bracket (improperly tightened ring nut)
- Bent steering stem
- Damaged ball bearing or bearing race
- 3. Front fork leg (s)
- Uneven oil levels (both front fork legs)
- Unevenly tensioned fork spring (both front fork legs)
- Broken fork spring
- Bent or damaged inner tube
- Bent or damaged outer tube
- 4. Swingarm
  - Worn bearing or bushing
  - Bent or damaged swingarm
- 5. Rear shock absorber assembly (-ies)
- Faulty rear shock absorber spring
- · Leaking oil or gas
- 6. Tire (s)
- Uneven tire pressures (front and rear)
- Incorrect tire pressure
- Uneven tire wear
- 7. Wheel (s)
- Incorrect wheel balance
- Broken or loose spoke
- Damaged wheel bearing
- Bent or loose wheel axle
- Excessive wheel runout
- 8. Frame
- Bent frame
- Damaged steering head pipe
- Improperly installed bearing race

#### Δ\$28710

## FAULTY LIGHTING OR SIGNALING SYSTEM Headlight does not come on

- Fuse open circuit
- Wrong headlight bulb
- Too many electrical accessories
- Hard charging
- Incorrect connection
- Improperly grounded circuit
- Poor contacts (main or light switch)
- Burnt-out headlight bulb

## Headlight bulb burnt out

- Wrong headlight bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded circuit

- Faulty main switch
- Headlight bulb life expired

## Tail/brake light does not come on

- Too many electrical accessories
- Incorrect connection

## Turn signal does not come on

- Fuse open circuit
- Faulty turn signal switch
- Faulty turn signal relay
- Burnt-out turn signal bulb
- Incorrect connection
- Damaged or faulty wire harness
- Improperly grounded circuit
- Faulty battery
- Blown, damaged or incorrect fuse

## Turn signal blinks slowly

- Faulty turn signal relay
- Faulty main switch
- Faulty turn signal switch
- Incorrect turn signal bulb

## Turn signal remains lit

- Faulty turn signal relay
- Burnt-out turn signal bulb

## Turn signal blinks quickly

- Incorrect turn signal bulb
- Faulty turn signal relay
- Burnt-out turn signal bulb

## Horn does not sound

- Improperly adjusted horn
- Damaged or faulty horn (Coil open circuit or damaged terminal)
- Faulty main switch
- Faulty horn switch
- Faulty battery
- Blown, damaged or incorrect fuse
- Faulty wire harness

## **TROUBLESHOOTING**

WIRING DIAGRAM
WR250R(X)/WR250X(X)
2008 WIRING DIAGRAM
1.AC magneto

2.Rectifier/regulator

3.Main switch

4.Battery

5.Main fuse

6.Starter relay

7.Starter motor

8. Right handlebar switch

9.Engine stop switch

10.Start switch

11.Relay unit

12. Sidestand switch

13.Neutral switch

14.Clutch switch

15.Fuel pump

16.ECU (electronic control unit)

17.Ignition coil

18.Spark plug 19.Intake solenoid

20.Fuel injector

21. Air induction solenoid

22.Intake air temperature sensor

23. Coolant temperature sensor

24.Speed sensor

25. Throttle position sensor

26.Intake air pressure sensor 27.Lean angle sensor

28.EXUP servo motor

29.Meter assembly

30.Neutral indicator light

31.Coolant temperature warning light

32.Engine trouble warning light

33. Fuel level warning light

34.High beam indicator light 35.Turn signal indicator light

36.Turn signal relay

37.Turn signal switch 38.Rear right turn signal light

39.Front right turn signal/position light

40.Front left turn signal/position

41.Rear left turn signal light

42.Headlight relay

43.Dimmer switch 44.Headlight

45.Horn

46.Horn switch

47.Left handlebar switch

48.Rear brake switch

49.Front brake light switch

50.Tail/brake light

51.License plate light

52.Radiator fan motor relay

53. Radiator fan motor

54.Headlight fuse 55.Signal fuse

56.Ignition fuse

57.Radiator fan fuse

58. Fuel injection system fuse

59.Backup fuse

EAS28750

**COLOR CODE** 

B Black Brown

Ch Chocolate

Dg Dark green G Green

Gy Gray

L Blue

O Orange

P Pink R Red

Sb Sky blue

W White Y Yellow

B/G Black/Green

B/L Black/Blue

B/R Black/Red

B/W Black/White B/Y Black/Yellow

Br/G Brown/Green

Br/L Brown/Blue

Br/R Brown/Red

Br/W Brown/White G/B Green/Black

G/R Green/Red

G/W Green/White

G/Y Green/Yellow Gy/G Gray/Green

Gy/R Gray/Red

Gy/Y Gray/Yellow

L/B Blue/Yellow

L/R Blue/Red

L/W Blue/White

L/Y Blue/Yellow

O/B Orange/Black

P/W Pink/White

R/B Red/Black

R/G Red/Green

R/L Red/Blue

R/W Red/White

R/Y Red/Yellow

Sb/W Sky blue/White

W/B White/Black

W/R White/Red

W/Y White/Yellow

Y/B Yellow/Black

Y/G Yellow/Green

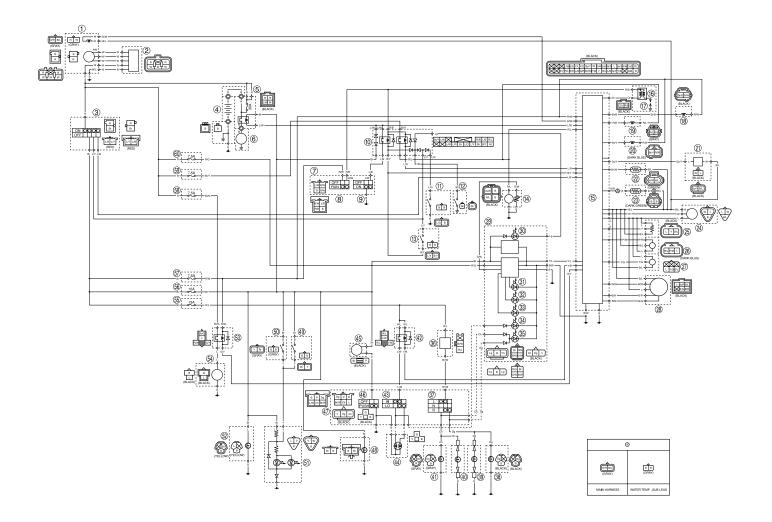
Y/L Yellow/Blue







WR250RX/WR250XX 2008 WIRING DIAGRAM WR250RX/WR250XX 2008 SCHÉMA DE CÂBLAGE WR250RX/WR250XX 2008 SCHALTPLAN SCHEMA ELETTRICO WR250RX/WR250XX 2008 DIAGRAMA ELÉCTRICO DE LA WR250RX/WR250XX 2008



WR250RX/WR250XX 2008 WIRING DIAGRAM WR250RX/WR250XX 2008 SCHÉMA DE CÂBLAGE WR250RX/WR250XX 2008 SCHALTPLAN

SCHEMA ELETTRICO WR250RX/WR250XX 2008 DIAGRAMA ELÉCTRICO DE LA WR250RX/WR250XX 2008

